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USSR Report

ELECTRONICS AND ELECTRICAL ENGINEERING

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UDC: 621.396.67

FLUCTUATIONS OF DIRECTIONALITY OF DISCRETE-SWITCHING PHASED ARRAY

Moscow RADIOTEKHNIKA in Russian No 7, Jul 85
(manuscript received after revision 2 Jan 85) pp 3-8

KAPLUN, I. V. and KHOLSHCHEVNIKOV, M. Yu.

[Abstract] A study is made of the fluctuation characteristics of the field radiated by a phased antenna array with random initial phase distribution as a function of the phasing angle, extent of phase switching and correlation properties of phase distribution. The statistical characteristics of the radiation pattern are computed. The equations derived in the article determine the variation in statistical characteristics of radiation pattern fluctuation parameters for a discretely switched phased array with random initial phase as a function of the phase angle, extent of phase control and initial phase distribution characteristics. The equations allow formulations of requirements which, when met, cause the array to fall within fixed limits with respect to radiation pattern for an array with precise phasing.
Figures 3; references: 6 Russian.
[10-6508]

UDC: 621.372.8.001.24

DIFFRACTION OF A PLANAR WAVE ON DIELECTRIC CYLINDERS

Moscow RADIOTEKHNIKA in Russian No 7, Jul 85
(manuscript received after revision 12 Dec 84) pp 8-13

VORONTSOV, A. A. and MIROVITSKAYA, S. D.

[Abstract] It has been shown that the diffraction method with recording of the diffraction picture in its central sector is most convenient for testing the dimensions and shape of optical fibers and capillaries under production conditions. An analysis of existing methods of mathematical processing of diffraction pictures in order to establish unambiguous relationships among recorded parameters and fiber diameter has allowed determination of the most promising method, construction of diffraction pictures in the central sector

of angles by solving the diffraction equation of a planar wave on dielectric cylinders modeling the fibers being measured. The mathematical model of the diffraction method developed in this article relates parameters of the diffraction picture to the geometric optics parameters of 1- and 2-layer dielectric cylinders by the use of modified rapidly converging series. Standard curves are constructed for a broad range of fiber diameters. The studies show that the nature of the diffraction pictures is significantly different for metallic and dielectric cylinders. Figures 7, references 8: 5 Russian, 3 Western.
[10-6508]

UDC 621.396.677.4

ENHANCEMENT OF POINTING ACCURACY AND UNIFORMITY OF BEAM MOVEMENT OF ANTENNA ARRAY WITH DISCRETE PHASE INVERTERS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 28, No 7, Jul 85 (manuscript received 24 Sep 84) pp 3-9

ZAYTSEV, V. A.

[Abstract] A simple method is proposed for calculating phase corrections in which the beam position is calculated by approximating the amplitude distribution by a step series and the phase distribution by a discrete function. It is found that adding corrections that are constant for a series of beam positions when computing the phases provides a significant reduction in the pointing error caused by the phase computer. The findings can be used in developing control systems for phased antenna arrays with enhanced pointing accuracy, as well as direction finding systems. Figures 4, references: 9 Russian.
[39-6900]

UDC 621.396.96

POTENTIAL ACCURACY OF MEASUREMENT OF DELAY OF SIGNAL PASSING THROUGH NONUNIFORM DISPERSE IONOSPHERIC LAYER

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 28, No 7, Jul 85 (manuscript received 29 Dec 84 after revision) pp 19-24

IPATOV, V. P., KOLOMENSKIY, Yu. A. and CHERNIKOV, D. Yu.

[Abstract] The potential accuracy of the method for eliminating ionospheric errors based on employing additional current measurements is assessed for the problem of estimating the delay, or delay difference, of signals passing through a nonuniform disperse ionosphere with an additive mixture of normal

white noise. The ionosphere is modeled by an equivalent linear filter whose unknown parameters remain fixed during the measurements. The cases of signals with known and unknown phase, as well as narrowband signals, are analyzed. References: 7 Russian.
[39-6900]

UDC 621.396.963.3

BASIC PARAMETERS OF STORAGE-TYPE RADAR INDICATORS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 7, Jul 85 (manuscript received 28 Oct 84 after revision) pp 67-68

BAKEYEV, D. A.

[Abstract] The use of digital memory in radar displays is analyzed. It is shown that digital memory makes it possible to increase the brightness of target blips, especially for long working ranges, to switch the scale of the radar image by changing the write frequency, which stabilizes the rate at which information is output from the indicator and the size of the blip, and also simplifies the CRT deflection system; it also improves the correct detection probability and increases the resolution in the local sector where the video signal is present. References 5: 1 Russian, 4 Western.
[39-6900]

UDC 621.396.96.06:681.001.57

MODELING OF ENVELOPE OF SIGNAL REFLECTED FROM AIRBORNE OBJECTS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 7, Jul 85 (manuscript received 4 Jul 84 after revision) pp 75-77

SERGENKO, V. D. and SHAKHRAY, A. Ya.

[Abstract] An algorithm is proposed for modeling the envelope of a signal reflected from airborne objects. The process is formed by passing the white noise through a discrete linear filter. The proposed algorithm can be used to assess the operation of radar signals in detecting and ranging various types of airborne objects. Figures 1, references 2: 1 Russian, 1 Western.
[39-6900]

UDC 621.371.246

EXPERIMENTAL DEFINITION OF A PART OF WATER VAPOR ABSORPTION COEFFICIENT NONLINEARLY DEPENDENT ON THE AIR HUMIDITY IN SHORT SUBMILLIMETER WAVE WINDOWS OF RELATIVE TRANSPARENCY

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY RADIOFIZIKA in Russian
Vol 28, No 6, Jun 85 (manuscript received 21 Jun 84) pp 671-676

SVERDLOV, B. A. and FURASHOV, N. I., Scientific-Research Radiophysics Insititute

[Abstract] Measurement data concerned with radiation attenuation in pure water vapor and in H_2O plus a dry air mixture are used to define a part of the water vapor absorption coefficient which is quadratically dependent on the absolute humidity of a vapor-air mixture. Measurements were conducted by an echelette vacuum spectrometer in windows of the relative transparency with centers at λ = 142.3, 118.9, 110.3, 105.6, 102.8, and 97.1 μm. σ(T = 310 K). The authors thank I. A. Rakov for computer calculations as well as G. A. Nersesyana and R. Ya. Tiraspolskiy for submitting calibration data for the PPV-P9 humidity sensor. Figures 2; tables 1; references 28: 15 Russian, 13 Western.
[38-6415]

UDC 551.510.535 + 550.385

EFFECT OF DETECTING VERY LOW FREQUENCY WAVES IN THE EARTH'S MAGNETOSPHERE

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian
Vol 28, No 6, Jun 85 (manuscript received 1 Aug 84) pp 677-683

SHCHEKOTOV, A. Yu., MOLCHANOV, O. A. and KRECHETOV, V. V., Institute of Terrestial Magnetism, Ionosphere, and Radio Wave Propagation, Academy of Sciences, USSR

[Abstract] The results are described of an experiment concerned with the effect on the modulation frequency of a very low frequency power transmitter of the detection of a magnetosphere signal (DMS) which appears on the magnetosphere plasma after exposure to a power modulated low-frequency wave. The possible mechanisms of DMS generation are discussed. Figures 4; references 11: 8 Russian, 3 Western.
[38-6415]

UDC 551.510.535

ELECTROMAGNETIC RADIATION OF ARTIFICIAL IONOSPHERIC PLASMA TURBULENCE

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 6, Jun 85 (manuscript received 3 May 84) pp 684-693

GRACH, S. M., Scientific-Research Radiophysics Institute

[Abstract] The paper investigates the generation mechanism of stimulated electromagnetic radiation of ionosphere plasma connected with excitation of intensive plasma waves and elongated heterogeneities as the result of the development of thermal parametric instability. A wide spectrum of the radiation is explained by the induced plasma wave scattering by ions. The radiation intensity dependence on its frequency and pumping wave power is obtained. The results of the investigation are in agreement with the data from experiments on the observation of stimulated ionospheric radiation.
The author thanks N. A. Mityakov, V. L. Frolov, S. A. Metelan, and A. N. Karashtin for discussion, as well as V. V. Vaskov for valuable comments. Figures 4; references 16: 11 Russian, 5 Western.
[38-6415]

UDC 538.566

ELECTROMAGNETIC FIELD OF IONOSPHERIC POINT DIPOLES IN EARTH-IONOSPHERE WAVEGUIDE

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 6, Jun 85 (manuscript received 11 Jan 84) pp 703-711

RYBACHEK, S. T., Leningrad State University

[Abstract] Excitation of a spherical earth-ionosphere waveguide by electromagnetic point dipoles located in the ionosphere is investigated. The method used is based on a generalized reciprocity theory, with the aid of which it is possible to establish a connection between this problem and the problem of locating fields in the ionosphere excited by sources located in the waveguide. Some numerical results are presented. The authors thanks V. L. Seninoy for conducting computer calculations. Figures 7; references 13: 8 Russian, 5 Western.
[38-6415]

UDC 537.8.029.6 + 621.37.029.64

SHIELDING OF E-POLARIZED ELECTROMAGNETIC WAVES BY CLOSED CYLINDRICAL SHELL

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY RADIOFIZIKA in Russian Vol 28, No 6, Jun 85 (manuscript received 5 Mar 84) pp 735-742

NAZARCHUK, Z. T., Physical-Mechanical Institute, Academy of Sciences, UkrSSR

[Abstract] Integral equations are constructed and an algorithm for their solution is obtained in the case of two-dimensional diffraction of an E-polarized electromagnetic wave by a thin closed cylindrical shell of an arbitrary profile with high but finite conductivity. A numerical solution of the equations is obtained using boundary conditons for the electromagnetic field on both sides of the shell's middle surface. The near field is calculated for the case when a non-circular shell is excited by a cylindrical or plane wave. Figures 2; tables 2; references 10: 8 Russian, 2 Western (1 in Russian translation).
[38-6415]

UDC: 621.396.96:523.4

USE OF EXTENDED COSMIC RADIATION SOURCES FOR RADAR STUDIES OF THE PLANETS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 6, Jun 85 (manuscript received 6 Jun 84) pp 1084-1090

PAVELYEV, A. G., KUCHERYAVENKOV, A. I.

[Abstract] A study is presented of the specifics of a method for radar studies of planets suggested in an earlier article using the cosmic radiation created by extended sources. In the correlation method suggested information concerning an area of a planet is obtained by analyzing the correlation function of the incident and reflected radiation, perhaps from a satellite orbiting the planet being studied. The variation in angular width of cosmic ray sources used for these studies as a function of frequency is described. Use of antennas with the optimal reception directivity pattern can expand the effective width of natural sources of cosmic radiation for these studies. In the low frequency band for which the altitude of the satellite over the planet is on the same order of magnitude as the wavelength, interference effects can be used to determine the variation in coefficient of reflection as a function of incident angle of radiation and to obtain the distribution of radiation intensities across the sky. Figure 1, references 3: 2 Russian, 1 Western.
[11-6508]

UDC: 537.8:621.391.821

THE NATURE OF BALL LIGHTNING

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 6, Jun 85
(manuscript received 9 Jul 82) pp 1151-1158

MUKHAREV, L. A.

[Abstract] A hypothesis concerning the physical nature of ball lightning is presented, based on the assumption that ball lightning consists of the excited charged field of an electromagnetic spherical wave in a charged aerosol medium, concentrated in a thin spherical plasma envelope of a corona discharge supported by the field. The field may be excited by a lightning bolt passing through the aerosol or by a sudden change in potential of the atmospheric electric field. The extent to which this assumption agrees with the known properties of actual ball lightning based on observations is analyzed. The hypothesis satisfactorily explains a set of phenomena related to ball lightning including high ball energy, development of ball lightning in the atmosphere after bolt lightning discharges, glowing of the ball not accompanied by significant thermal radiation, noise radio radiation, long lifetime, independent movement in the atmosphere, presence of high electric potential within the ball, low density and tremendous specific energy of ball matter, existence of free and coupled balls, mechanical and thermal effects arising upon collision of a lightning ball with an obstacle and the capability to explode without visible cause. References 9: 8 Russian, 1 Western.
[11-6508]

UDC: 523.164.75

REFLECTION OF RADIO WAVES IN RADIO OCCULTATION OF THE SOLAR CORONA

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY RADIOFIZIKA in Russian
Vol 28, No 7, Jul 85 (manuscript received 3 Apr 84) pp 807-815

KUCHERAVENKOV, A. I., PAVELYEV, A. G., RUBTSOV, S. N. and YAKOVLEV, O. I.,
Institute of Radio Engineering and Electronics, USSR Academy of Sciences

[Abstract] Spacecraft have transmitted radio signals as they flew behind the planets, so that the signals were transmitted through the atmosphere of the planets just before occultation. When this is done, a wave reflected from the surface of the planet is received. When the same process is used to study the solar corona, a reflected wave may also be received. Bistatic studies using a spacecraft and terrestrial radio are useful. Signals may be radiated from the spacecraft and received on the earth or vice versa. This article studies the capabilities of bistatic radar studies of the sun. The frequency difference between the direct and reflected waves, absorption and

refraction attenuation of radio waves are calculated. In the decimeter band the reflected wave can be detected by either frequency or time selection. Areas most convenient for frequency separation are determined as a spacecraft separation of 1.7 solar radii. Figures 6, references 17: 7 Russian, 10 Western.
[8-6508]

UDC: 621.371.332.4

MODELING OF PROCESSES OF RADIO WAVE SCATTERING BY ICE COVER

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY RADIOFIZIKA in Russian Vol 28, No 7, Jul 85 (manuscript received 3 Apr 84; after revision 31 Oct 84) pp 816-822

TIMCHENKO, A. I., SINITSIN, Yu. A. and YEFIMOV, V. B., Institute of Radio Physics and Electronics, Ukrainian Academy of Sciences

[Abstract] A study is made of the reflection of radio waves by a dielectric layer with rough boundaries with various values of absorption coefficient within its volume. Studies were performed within the framework of the theory of radiation transfer, the advantage of this approach being its conceptual simplicity. Numerical results are compared with experimental data. One of the determining characteristics of the age of ice is found to be its absorption of radio waves, leading to a decrease in scattering intensity on younger ice. Figures 6, references 10: 6 Russian, 4 Western.
[8-6508]

UDC: 550.388.2

ERROR OF SLF NOISE SPECTRUM ENERGY ESTIMATION

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY RADIOFIZIKA in Russian Vol 28, No 7, Jul 85 (manuscript received 10 Sep 84) pp 927-929

BORDYUZHENKO, V. S., Vinitsa Polytechnical Institute

[Abstract] A study is made of natural super low frequency (SLF) electromagnetic signals generated by lightning. Estimation of the spectrum of these signals requires that the interference of radio waves excited by other discharges be considered. Calculations are performed assuming that the narrow band SLF receiver recording the vertical component of the electric field receives a random sequence of pulses with Poisson distribution. It is found that error decreases monotonically with increasing dispersion and excess with balanced placement of sources. With slight dispersion the error in spectral estimation increases with increasing asymmetry and decreasing excess of the distribution of lightning bolts. The maximum error reaches

60% in some cases, decreasing rapidly with increasing frequency.
Figures 3, references: 3 Russian.
[8-6508]

UDC: 537.87

DIFFRACTION OF ELECTROMAGNETIC WAVES ON HETEROGENEOUS MAGNETICALLY ACTIVE PLASMA CYLINDER

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 7, Jul 85 (manuscript received 24 Sep 84) pp 932-936

AZARENKOV, N. A., KONDRATENKO, A. N. and OLIFIR, V. P., Kharkov State University

[Abstract] A study is made of the diffraction of a flat TM wave leaving the area of a homogeneous plasma to strike perpendicularly a plasmaccylinder with heterogeneous radius in a magnetic field parallel to the axis of the cylinder. The results obtained for diffraction of low frequency waves propagating in a compact plasma on rarefactions in a cylindrical symmetry plasma show that for the incident wave frequencies and cylinder radius studied as density increases in the area of homogeneity, oscillations of the differential scattering cross-section appear, which disappear at sufficiently great k_tR. The same oscillations occur with a decrease in magnetic field H_0 with other parameters unchanged. These resonances are similar to electromagnetic resonances in a plasma cavity. Figures 4, references 14: 13 Russian, 1 Western.
[8-6508]

/9835

UDC 621.396.9

COMPUTER CALCULATION OF NUMBER OF FREQUENCY CHANNELS IN TV BROADCAST NETWORK

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 5 Sep 84) pp 43-46

NOSOV, V. I., KOKOREV, A. V., AKHTYRSKIY, V. N., VOINTSYEV, G. A., and KRASNOSHCHEKOV, R. A.

[Abstract] A method for computer synthesis and analysis of a uniform transmitter TV broadcast network is proposed. The method can be used, for a given number of channels to synthesize a uniform network (to determine the deployment of transmitters and perform the frequency allocation), and then to analyze the network (to calculate the coverage zone of the transmitter considering the interference present in the network). The machine model speeds up calculations, and makes it possible to analyze numerous different TV network structures and to find the optimal version to provide continuous coverage of a region with multiple-program TV broadcasting. Figures 4, references 8: 7 Russian, 1 Western.
[43-6900]

UDC 621.391.837:621.371.222

EXPERIMENTAL INVESTIGATION OF DIRECTIVITY CHARACTERISTICS OF RECEIVING TV ANTENNAS

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 24 Aug 84) pp 47-50

SHUR, A. A., MELNIKOV, B. F., and SHERGIN, N. N.

[Abstract] The directivity characteristics of receiving TV antennas operating in bands I-V over different terrain are measured for signals with various polarization. Yagi antennas developed for group television reception in bands I-III were investigated; the antenna investigated for bands IV-V was the standard ATKG-5.1.21-41.6 multichannel antenna. Modifications and clarifications to CCIR Recommendations for modern TV antennas are

suggested on the basis of the data obtained. Figures 9, references 5: 3 Russian, 2 Western.
[43-6900]

UDC 621.391.82:621.397.132

INCREASING INTERFERENCE IMMUNITY OF TELEVISION CHANNELS AND MORE EFFECTIVE UTILIZATION OF THEIR CAPACITY

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 7, Jul 85 pp 29-33

ATAKHANOV, R., Kibernetika Scientific-Industrial Association, UkSSR Academy of Sciences

[Abstract] A method of optimizing the energy spectrum of video signals in television channels by means of predistortion in the encoder and correction in the decoder has been developed, on the basis of linear prediction and limitation, which will reduce the redundancy and thus weaken the correlational coupling between elements and between lines so as to prevent the shift of the energy peak from the high-frequency range into the more interference-prone low-frequency range. An experimental implementation of this method has improved the signal-to-noise ratio by 10-12 dB in a black-and-white TV channel and by 7-9 dB in a color TV channel. Both theoretical analysis and experimental operation have led to refinement of this method, in terms of transmission of the necessary additional data and the equipment for it. The main color video signal passes successively through a d.c. restorer, a predictor, a low-pass filter (6.5 MHz cutoff), and an amplifier with attenuator feeding its d.c. component to one of the two summator inputs. The narrow-band auxiliary white-and-black video signal on a subcarrier which is amplitude-modulated with a single sideband passes to the other input of that summator. The group signal from the summator output passes through a low-pass filter (10 MHz cutoff) to the modem moudlator. From the modem de-modulator lead two channels: filter - amplifier - decoder (corrector) - monitor for the encoded color signal and high-pass - amplitude detector - low-pass - monitor for the black-and-white signal. The optimum subcarrier frequency (6.973 MHz) and encoder-decoder parameters ensuring adequate interference immunity for the auxiliary black-and-white signal have been established experimentally. Another technique of transmitting additional data is based on narrowing the dynamic range while increasing the bandwidth of the encoded color signal so as to narrow the spectrum of fluctuations frequency-modulated by the encoded color signal. Several encoder-decoder variants with discrete or segmental adaptation have been evaluated both theoretically and experimentally, on the basis of a universal simulation model, also a method of multiplexing TV channels, albeit with some loss of information but adequateffor satellite TV broadcasting over existing radio relay links in accordance with CCIR standards. Figures 2; references: 23 Russian.
[40-2415]

UDC 621.391.88:621.397.13

SOME PROBLEMS IN REPRODUCTION OF TELEVISION IMAGES WITH BETTER DEFINITION

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 7, Jul 85 pp 34-38

NOVAKOVSKAYA, O. S., All-Union Scientific Research Institute of Cinematography

[Abstract] New minimally wide microformats can ensure a better quality of reproduced television images than the existing formats, in both black-and-white and color systems, but a better image definition requires a better transmission quality and a better receiver quality. The main problem in adaptation to the new formats is design of the receiver screen, most expediently for the two not very different formats 6:2 = 2:1 and 5.55:3 = = 1.85:1. For the purpose of design analysis, both black-and-white and color TV receiver screens can be classified into three size categories: 30-40 cm (minisets), 50-100 cm (home sets), 2-6 m (auditorium sets). The screens must meet several requirements for good viewing in both dark and lighted rooms, namely: high resolution, high white brightness, fast excitation and short afterglow, high contrast ratio (at least 100), wide chrominance ranges of the three primary colors, high luminance in the three primary colors and high efficiency of their channels, 2.5-3.0 modulation index, video signal of not more than 30-40 V peak-to-peak for maximally bright white, high voltage not above 2.5 kV, simple low-power glow control circuit, long service life (20 years based on average 5 h daily), and for minisets also small weight. Under consideration are flat screens. According to the method of excitation, they are of the gas-discharge (plasma) type, electro-luminescent type, liquid-crystal type, and cathode-ray type with either a cold cathode or the Eiken-Gabor kinescope. Glow control of flat screens can be effected by the analog method when the focused electron beam travels monotonically across the luminophorous surface during the forward stroke, or by the discrete method which involves varying the potentials at the control electrodes for switching through a commutator the elements of the screen array. The problem in color transmission is to suppress or eliminate crosstalk between chrominance singals and interference from luminance signals. It is expected to take 30-50 years before microformats with superhigh image definition will be ready for introduction into television broadcasting. Tables 2; references 16: 11 Russian, 5 Western (2 in Russian translation). [40-2415]

UDC 621.397.6

COMMUTATOR FOR SWITCHING TELEVISION SIGNALS

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 7, Jul 85 pp 42-43

ANDRUSENKO, V. V., ANITSOY, E. I., RUBAN, I. Yu. and KHABLYUK, A. F.,
Kirovograd Radio Products Manufacturing Plant

[Abstract] A commercially manufacturable television commutator with a 10x10 field has been developed and designed at the Special Engineering Office of the Kirovograd plant. This S-08 device is capable of switching 80 video signals from any of 10 inputs to any 10 outputs, with the possibility of splitting each output into three. The control signal contains two groups of binary-decimal codes carrying information about the number of the input from which a signal is to be taken and the number of the output to which it is to be sent respectively. The commutator can switch synchronous and asynchronous full TV signals of 1 V peak-to-peak, with not more than 0.8° differential phase distortion and 0.8% differential gain distortion. Its transmission coefficient is 1 ± 0.01 and its amplitude-frequency characteristic is uniform within 2%, referred to the 1 MHz point, over the 0.1-6 MHz range. Crosstalk attenuation does not exceed -50 dB at 4.43 MHz, skew of the line line and field frequency pulse does not exceed 1%. The commutator is packaged in a "Baza-2" standard 9-tier bay and draws a power not exceeding 700 W. Figures 2; tables 1; references: 1 Russian.
[40-2415]

UDC 621.397.61:681.772.7(064)

HIGH-DEFINITION SATELLITE TELEVISION BROADCASTING SYSTEM

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 7, Jul 85 pp 65-66

ANTIPIN, M. B.

[Abstract] A high-definition satellite television broadcasting system by the Japanese NHK Co, shown at the 1985 "Expo 85" scientific and technical exhibition in Tsukuba (Japan), has been installed on the first in the world VS-2 direct TV broadcasting staellite for home viewing. It operates at the 12 GHz frequency with a 100 W transceiver for simultaneous handling of two programs from a 2 kW ground station. It does not use frequency interlacing, luminance signals and chrominance signals being carried in different frequency bands but within a 30 MHz channel which accomodates up to five standard video frequency bands. Multiplexing for transmission within an 8 MHz frequency band in a 4:1 ratio is made possible by the Multiple Sub-Nyquist Sampling Encoding method, with conversion of analog R,G,B color signals from the camera into digital luminance and chrominance signals. The restored luminance and chrominance singals are respectively 25 MHz wide and 7 MHz wide for the stationary part of an image, 15 MHz wide and

4.5 MHz wide for the moving part of an image. The multiplexed audio signal, companded two digital audio signals, is fed in during the frame quenching pulses with 12 bits/reading and 33,750 readings/s. Figures 3; tables 1; references 4: 1 Russian, 3 Western.
[40-2415]

UDC 621.327.52:546.295.002

NEW MANUFACTURING PROCESS FOR PARTS OF DksSHRB XENON LAMPS

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 7, Jul 85 pp 58-59

BELETSKIY, Ye. A., Roskinotekhnika (RSFSR Motion-Picture Engineering Association), NIKISHIN, Yu. A., Tula Repair-Production Combine, MIROPOLSKIY, Yu. A., FILIPPOV, Yu. K. and GIPP, L. V., Moscow Institute of Automotive Mechanics

[Abstract] A new cold die forging technology for producing anode mounts, cathode mounts, sockets and other parts of DKsSHRB 3000-1/10000-1 xenon lamps of the Moscow Electric Lamp Manufacturing Plant has been developed at the Moscow Institute of Automotive Mechanics (Chair of Machinery and Technology for Pressure Treatment of Metals) and experimentally tried at the Tula Roskinotkehnika repair-production combine. The main purpose was to eliminate waste of nonferrous metals and alloys in the process, which can be achieved with a 4-position automatic press. After cutting of blanks from an ingot bar, the successive operations are: 1) straightening and chamfering both ends in first position; 2) forward and reverse extrusion in second position; 3) forward extrusion of hollow rod in third position; 4) upsetting one end to form flange and straightening other end of tube in fourth position. Using the 1250 kN AV1921 Azov Automatic Forging Press should improve the utilization of metal from the present 23% to 100% and increase the productivity by a factor of 60, with an annual cost saving of 600,000 rubles. Figures 2; tables 1.
[40-2415]

MOSCOW SATELLITE SYSTEM FOR TRANSMITTING TELEVISION SIGNALS

Moscow VESTNIK SVYAZI in Russian No 9, Sep 85 p 32

SARTBAYEV, A. D., head of electronics department, Alma-Atinsk Institute of Railroad Transport Engineers; and TORTBAYEV, K. A., senior scientific coworker

[Abstract] This paper describes in detail the Moscow space television system, first used in 1980, which operates through the Horizon communication satellite. During 1981, 12 receiving stations of the Moscow system entered into operation in Kazakhstan and at present 5 low-power relay stations operate on their base. (The remaining stations are installed on a base of the acting network of the Orbit system.) In the current five-year plan principal attention is given to the development of a network of low-power relay stations with a supply of programs from statellite television systems - primarily with use of the Moscow system. The plan providing for the supply of television programs contemplates using more than 1.5 thousand stations of the Moscow system. The Moscow equipment will primarily provide for assigned central and boundary regions of Kazakhstan. Figures: 1.
[88-6415]

SEVEN-BAND SW RECEIVER

Moscow RADIO in Russian No 6, Jun 85 pp 17-21

STEPANOV, B. and SHULGIN, G.

[Abstract] In response to a letter from a reader asking for a design for a shortwave receiver capable of receiving all ham radio bands and using no scarce parts, the editors present a description and schematic diagrams for a newly designed simple 'all-band' medium-class SW receiver based on the Radio-76 transceiver. The article will be continued with additional construction details. No PC layouts or photographs are presented.
[16-6508]

TEST SIGNAL GENERATOR

Moscow RADIO in Russian No 6, Jun 85 pp 30-32

DERGACHEV, V., Cherkassy

[Abstract] A test signal generator, a drawing of which is found on the inside back cover along with a PC board layout, is presented. The generator is designed to be connected to the antenna input of a television set turned to [Soviet] Channel 1 or Channel 2. The generator produces various test images on the screen, allowing adjustment of the set. Brief instructions for assembly and adjustment are included.
[16-6508]

NEW 'PROFESSIONS' FOR THE B3-23 CALCULATOR

Moscow RADIO in Russian No 6, Jun 85 pp 33-35

TISHCHENKO, V.

[Abstract] A group of secondary school students has developed new and improved designs for the B3-23 calculator. The students have assembled these designs and tested them. This article discusses some of the designs. They include a stop watch, clock, electronic cube game, multimeter and race game. All of the improvements involve addition of a few components. Schematic diagrams for the improvements are presented.
[16-6508]

SYNCHRONOUS DETECTOR IN SUPERHETERODYNE AM RECEIVER

Moscow RADIO in Russian No 6, Jun 85 pp 42-44

ABRAMOV, A., Mendeleyevo, Moscow Oblast

[Abstract] This article discusses how to build a synchronous detector into an AM superhet receiver, significantly improving signal demodulation quality. Simple replacement of detectors disrupts operation of the receiver's AGC circuit, requiring a number of changes to made to the synchronous detector before it is installed in the receiver. This article describes these changes. The synchronous detector is capable of stable operation even with weak signals, though selectivity may be inferior to that of the standard detecting diode circuit. Reference 1 Russian.
[16-6508]

LOW-FREQUENCY MEASURING SET: FUNCTION GENERATOR

Moscow RADIO in Russian No 9, Sep 85 pp 42-44

BOROVIK, I., Moscow

[Abstract] The function generator for low-frequency measurements with a set designed for radio hams consists essentially of a ring circuit formed by the operational amplifier of a Schmidt trigger and an integrator, with the output of one connected to the input of the other. Such a device constitutes an oscillator, a square-wave voltage appearing at the trigger output and arramp voltage appearing at the integrator output. Use of a K548UN1 4-4.5 V microcircuit for preamplification of audio-frequency signals has been found to ensure an adequately high linearity of voltages over the entire 2-20,000 Hz frequency range. A sine-wave voltage is generated by means of a converter built either with discrete components or with a general-purpose operational

amplifier, requiring in each case a stabilized unipolar or bipolar supply voltage. This converter actually generates a parabolic voltage closely approximating a sinusoidal one and it has a second amplifier which acts as buffer separating the shaping circuits from the load. The performance characteristics of the function generator are quite satisfactory, except for an excessively high ripple factor in the sine-wave mode which renders it unsuitable for distortion measurement in the presence of operating high-quality audio equipment. Its main feature is the wide diversity of output signals it can generate. The frequency and the amplitude of its output signals are regulated by an adjustable resistor and a fixed resistor respectively. A current limiter in the K548UN1 microcircuit provides adequate protection against short circuit on the load side. All components, except resistors, switches, and rosettes, are mounted on one printed-circuit board made of copper-clad Textolite. Any two-conductor cable with or without shielding will connect the function generator to a volt-ohm-ammeter. Tune-up of the function generator begins with calibration in the 20-200 Hz subrange. Figures 8; references: 2 Russian.
[37-2415]

CONSUMER RADIO EQUIPMENT TOWARD END OF FIVE-YEAR-PLAN PERIODS: TELEVISION SETS

Moscow RADIO in Russian No 9, Sep 85 pp 12-14

GUSAROV, A., Moscow

[Abstract] The number of TV receiver models for consumer use has been steadily increasing during the eleventh five-year-plan period, over 60 different color TV set and 30 different black-and-white sets being now available. In the year 1985 there has begun a change-over which will continue throughout the remaining years of this five-year-plan period, namely to mass production of USTsT color TV sets. The new line is a standardized one, with complete conversion to semiconductor components in a modular console. The sets operate with a pulsed power supply without power transformer but with internal voltage stabilization, which eliminates the need for an external stablizer. They include a kinescope with self electron beams, which allows increasing the brightness and the saturation level of color images. Some models have a dial for selection of high-frequency channels only, some have also a dial for selection of ultrahigh-frequency channels, and some have a pushbutton for program selection with indication of the program number by a light-emitting diode. The large 61 cm sets are produced in the version, with self-adaptation of electron beams and with a plain kinescope respectively. In the meantime the production of hybrid sets with both tube and semiconductor components is also continuing. The production of black-and-white sets has not been changing, but will eventually be expanded to include the new UST-50/61 line with a high degree of microcircuit integration and with latest circuit components. Tables 1.
[37-2415]

COMPONENTS OF MODERN SHORT-WAVE TRANSCEIVER

Moscow RADIO in Russian No 9, Sep 85 pp 17-19

DROZDOV, V., Moscow

[Abstract] This is the second part of the article by V. Drozdov (part 1 in RADIO No 8, 1985) describing a modern short-wave transceiver. There are two sets of LC-type band filters, one in the transmitter channels and one in the receiver channels, the eight channels for each side being 1.8, 3.5, 7, 10, 14, 18, 21, 28 MHz. These filters can be switched by means of relays or commutating diodes. There is a ladder-type quartz filter for master selection, with tank circuits shunted by coils to ensure the correct passband and a symmetric amplitude-frequency characteristic. These coils and the parallel capacitors of the tank circuits tune the latter to a frequency close to that of the intermediate-frequency stage. With the coupling capacitors they form a parasitic band filter with a passband within the 1-4 MHz range, but this passband is effectively suppressed by circuits in the intermediate-frequency stage. The filter stage with a 0.8 kHz bandwidth has a symmetric amplitude-frequency characteristic without being shunted by compensating coils. The i-f amplifier, built on a low-noise field-effect transistor, is mounted on the same chassis with the master-selection filter. All filters are best tuned by measuring the amplitude-frequency characteristic and adjusting the tank circuits till the nonuniformity of that characteristic drops to the acceptable level. Adaptation of the tank circuits for frequencies other than those for which they have been designed by the author or adaptation of other types of tank circuits for this transceiver will require a redesign of the coupling capacitors and matching them with appropriate other compensating coils. Figures 3; tables 1; references: [illegible] Russian.
[37-2415]

DEVICE FOR ANTENNA ORIENTATION

Moscow RADIO in Russian No 9, Sep 85 pp 44-47

GLADKOV, I., YEFANOV, V. and FAZYLOV, G., Odessa

[Abstract] A device has been developed for precise orientation of television receiver antennas relative to far located television transmitter stations. It is suitable for collective or individual use, in urban or rural locations, its range covering all available 12 high-frequency channels. The device includes equipment for measuring the level of radio-frequency signals, through an r-f amplifier and an i-f amplifier followed by a heterodyne, at the antenna output and thus determining the zone of assured reception. It also includes equipment for checking the feeders and the amplifiers as well as means for indicating where an antenna should be mounted for avoiding uncertain reception. Voltages are measured by rotating the slider of a helically wound adjustable resistor in the negative-feedback loop around a

d.c. amplifier. The basic device consists of an SK-M-20 channel selector and a 3-stage intermediate-frequency amplifier, the latter including an operational amplifier with negative feedback through two resistors and with one trimming resistor. The same stabilized 3-wire 12 V voltage source consisting of two 6 V batteries in series with a center tap supplies both the d.c. amplifier and the i-f amplifier, with $\pm$6 V and 12 V respectively. The voltage stabilizer draws a current of not more than 1 mA and can operate with the batteries down to 5 V, but its sensitivity is then reduced and the scale calibration becomes inadequate for more than rough indication of the correct antenna orientation. Tune-up of this device begins with the stabilizer. Figures 8; references: 2 Russian.
[37-2415]

UDC: 534.79.001.24

METHOD OF CALCULATING LOUDNESS LEVELS OF COMPLEX SOUNDS

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 5, May 85 pp 27-29

NECHAYEV, I. K., Leningrad Institute of Motion Picture Engineering

[Abstract] An algorithm is presented for calculating the loudness level based on the Stevens Mark-VI method. Geometric constructions are used to obtain a simple rule for conversion of levels of sound pressure to the equivalent sound level at the geometric mean frequency 1000 Hz. The levels at 1 kHz can be converted to loudness indices by means of a polynomial equation, and signal loudness levels can be computed. A structural diagram has been developed of an algorithm for calculating loudness levels for use on computers. The method of computation is illustrated by an example of calculation of the loudness level of a motion picture camera. Figures 3, references 7: 2 Russian, 5 Western.
[9-6508]

UDC: 621.391.832.2:621.397.13

LINEAR DISTORTIONS OF SIGNALS IN A SYSTEM FOR TRANSMITTING SUPPLEMENTARY INFORMATION

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 5, May 85 pp 36-41

DOROSHENKO, I. V., Moscow Scientific Research Institute of Television

[Abstract] Linear distortion must be considered one of the most important factors influencing the selection of a system of parameters for a supplementary information transmission system intended to transmit additional information 'between the frames' of a television broadcast. This article studies aspects of research in the area, presents criteria for estimating

the degree of distortion and calculating signal forms and presents elementary pulses which can be used in teletext systems. A model is presented of the continuous (signal values) portion of the discrete signal used for teletext transmission. The specific tasks of calculating the form of the elementary pulse at various points in the model of the continuous portion of the discrete teletext information channel and production on this basis of a set of equations for variation in circular diagram height as a function of transmission rate over a broad range of various parameters of line circuits and elementary pulses can be performed by computer.
Figures 5, references 23: 12 Russian, 11 Western.
[9-6508]

UDC: 621.397.61:681.772.7]:681.325.5-181.4

MICROPROCESSOR SUBSYSTEM FOR SPECTRALLY ADAPTIVE TELEVISION CAMERA

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 5, May 85 pp 42-46

BUYMISTRYUK, G. Ya., All-Union Correspondence Electric Engineering Institute of Communications

[Abstract] An analysis is presented of the microprocessor section of a spectrally adaptive TV camera utilizing a tunable acoustical optical filter capable of performing spectral optical filtration of images with high spectral transmission adjustment rate, no moving mechanical parts, fully electronic control and the ability to work with arbitrarily selected spectral zones, permitting multispectral transmission and arbitrary modification of spectral characteristics of transmission by means of amplitude and frequency modulation of the electrical signals sent to the filter. The hardware and software of the microprocessor control system used with this device are discussed. The use of multisection microprocessor systems with microprogram control in combination with the principles of duality, parallel operation and conveyor processing of operands can solve problems of adaptive filtration, analysis and processing of optical and video signals in real time. Spectral adaptation algorithms do not require element-by-element processing of images, allowing them to be implemented in real time by effective division of functions. Figures 4; references 12: 9 Russian, 3 Western.
[9-6508]

UDC: 621.397.13:621.315.212:681.7.068

CABLE TELEVISION SYSTEM USING FIBER OPTIC COMMUNICATIONS LINES

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 5, May 85 pp 46-49

GRINSHTEYN, M. L., KABESHEV, V. D., KIRILLOV, V. I., SERIKOV, V.V ., TARCHENKO, A. A., TARCHENKO, N. V. and TKACHENKO, A. P., Minsk Institute of Electronic Engineering

[Abstract] Since virtually none of the 80 million TV receivers in the USSR have video frequency inputs, for the initial stages at least it is desirable to transmit signals over fiber optical cable systems at broadcast frequency. The parameters of a TV system using fiber optic communications lines are calculated using equations presented in the article. Tests confirm that the fiber optic cable line described in the article satisfies the requirements for use in cable TV systems. Optical communications lines up to 5 km in length can be used by decreasing attenuation to approximately 3 dB/km and increasing bandwidths to 200 MHz·km, allowing a transition to be made to a higher carrier frequency and greater deviation, increasing the signal/noise ratio. Figures 3, references: 8 Russian.
[9-6508]

/9835

UDC: 621.372.54.037.372

CALCULATION OF SIGNAL QUANTIZATION NOISE DISPERSION IN SECOND ORDER DIGITAL RECURSIVE FILTERS

Moscow RADIOTEKHNIKA in Russian No 7, Jul 85 (manuscript received 3 Nov 84) pp 40-43

PETROVSKIY, A. A. and GANUSHKIN, Yu. A.

[Abstract] A table of equations is presented for computing the dispersion of output noise resulting from quantization of a signal in an analog-digital converter or a digital filter with various transfer functions. It was assumed in developing the equations that signal quantization errors in the ADC are additive white noise at the input of the digital filter with zero mean and known dispersion related to the square of the quantization interval. Analysis of the tables of equations indicates that introduction of nulls to the transfer function at $z = 0$ does not influence the signal quantization noise dispersion component at the output of the digital filter. The equations can be used to calculate the dispersion of the input noise component resulting from rounding of the results of arithmetic operations as well. References: 3 Russian.
[10-6508]

UDC: 621.391.2

OPTIMAL RECEPTION OF CONTINUOUS SIGNALS AGAINST A BACKGROUND OF CHAOTIC PULSED NOISE AND WHITE NOISE

Moscow RADIOTEKHNIKA in Russian No 7, Jul 85 (manuscript received after revision 16 Jan 85) pp 64-67

AFRIKANOV, S. A. and SERDYUKOV, P. N.

[Abstract] The purpose of this work was to produce algorithms for nonlinear filtration of continuous signals against a background of white noise and chaotic pulsed noise with continuous amplitude distribution. In order to check the algorithm obtained, statistical modeling was performed on a computer with the step selected so that not over 80 periods of the carrier frequency

fell in each step to allow precise reproduction of the FM signal spectrum. The results of modeling confirm the correctness of the theoretical approach selected and indicate the possibility in principle of compensating for pulsed noise in processing devices. The practical capabilities of the algorithm developed are limited since the shape of the pulses of noise and nature of its effect on the useful signal at the input of the receiver are usually not precisely known. Figures 3, references: 6 Russian.
[10-6508]

UDC: 621.391.144

SPECTRA OF MULTIPHASE NOISE-LIKE SIGNALS

Moscow RADIOTEKHNIKA in Russian No 7, Jul 85
(manuscript received after revision 21 Jan 85) pp 67-69

ZHITKOV, V. V.

[Abstract] An equation is derived for the energy spectrum of phase-keyed noise-like signals with arbitrary numbers of phase gradations in the form of a trigonometric series whose coefficients are defined as finite sums of quadratic forms. Computers as well as correlation methods with subsequent processing of the results of computation of the quadratic forms by means of a specialized microprocessor can be used to calculate the required coefficients of the equation. Figure 1, references: 4 Russian.
[10-6508]

UDC: [537.622.4:539.216]517.97

VARIATIONAL METHOD OF COMPUTING CHARACTERISTICS OF MAGNETOSTATIC WAVES IN OBLIQUELY MAGNETIZED TWO-DIMENSIONALLY LIMITED FERROMAGNETIC FILMS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 6, Jun 85
(manuscript received 16 Nov 82) pp 1080-1083

SUCHKOV, S. G.

[Abstract] The width of ferromagnetic films used in practice, 0.2-2.0 mm, is comparable to the length of the magnetostatic waves they process. Therefore, when calculating the characteristics of the waves one must consider the width limits of the films. There is no simple analytic solution to this problem and requires the use of approximate numerical methods such as the variational method. This article constructs a steady functional and a variational method based on it for computation of the dispersion characteristics and field structures of magnetostatic waves in a five-layer metal-dielectric-ferromagnetic film-dielectric-metal structure of this type with arbitrary orientation of the magnetizing field. The method is sufficiently accurate for use in automated radio signal processing device planning systems. Figures 2, references 5: 4 Russian, 1 Western.
[11-6508]

UDC 621.376.57

ANALYSIS OF SPEECH SIGNAL INTERPOLATION METHOD

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 14 Feb 84) pp 22-25

ZVONKOVICH, V. R., KOKOSHKIN, V. P., SAFONOV, P. V., and SITNYAKOVSKIY, I. V.

[Abstract] The block pulse-code modulation method, which is an extension of the variable-length code word principle, for speech signal interpolation is analyzed. In the block PCM method, the input signal from each channel in the transmission system is broken into blocks of a specified length and analyzed in order to normalize the signal within a given block. In order to recover the original information at the receiving end, additional signal normalization values must be sent. The block PCM method can be implmeneted for digital input signals by eliminating the high-order bits in the PCM signal samples whose values are logical zero during the analysis time. The analysis showed that the optimal block length is close to 16 signal samples, comprising two milliseconds. It is found better to use 8-bit logarithmic code rather than linear 12-bit code for the digital signal transmitted by IKM-30 equipment. Simulation results indicate that the block PCM method satisfies CCITT recommendations for the signal/quantization noise level for transmitting 60 telephone channels at a line rate of 2.048 Mbps. Figures 3, references 7: 6 Russian, 1 Western.
[43-6900]

UDC 621.396.46

11 GHz RADIO RELAY TRANSMITTER EMPLOYING TWO AVALANCHE TRANSIT-TIME DIODES

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 11 Jan 85) pp 20-22

NIKOLAYEV, A. N., SUKHOMLIN, K. B., and SHIROKOV, V. Ye.

[Abstract] A standardized radio relay transmitter is described that supports the transmission of digital information at 8.448 Mbps, as well as analog

information (1920 voice grade channels, or color television and tv audio signals (two channels). By using two avalanche-transit time diodes--one in the injection-frequency oscillator and the other in the output power amplifier--it has been possible to improve power indicators. The frequency converter, power amplifier, and detector sections are described, and the basic parameters of a transmitter are tabulated. Continuous operation of these transmitters on terrestrial trunks have shown them to be highly reliable. The transmitters have been put into commercial production. Figures 3, references: 8 Russian.
[43-6900]

UDC 621.396.43:621.3.019.3

RELIABILITY AND STABILITY OF RADIO RELAY TRUNKS

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 28 Nov 84) pp 16-19

RAKOV, A. I. and ASHIROV, V. K.

[Abstract] A method is presented for calculating the reliability of a radio relay link a priori in accordance with CCIR Recommendation 557, which requires that the stability as well as reliability of radio relay links be calculated during the design stage. In the proposed method, the results of the stability calculation are used for the reliability calculation. Figures 3, references 8: 7 Russian, 1 Western.
[43-6900]

UDC 621.395.345

TESTING TECHNICAL CONDITION OF ELECTRONIC SWITCHING FIELDS

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 6 Jan 83) pp 11-15

GOLOMSHTOK, L. V.

[Abstract] Different types of testing, systematized in accordance with existing USSR and foreign electronic switching center developments in the light of CCITT Recommendations, are examined. Continuous testing is used for integrity testing of switching field equipment and detects any switching field malfunction practically as soon as it occurs. On-line testing is used to verify that the switching field equipment is operating properly while calls are being handled. Periodic testing is used to test the operation of switching field equipment on a scheduled basis. Statistical quality control is used to check call handling performance at an electronic switching center. Diagnostic testing is used to overcome the effects of a malfunction

detected by the aforementioned methods, and is executed mainly under program control. Implementation of all of these types of switching field testing makes it possible to reduce exchange maintenance labor, conserve materials, and save time, while ensuring the operating reliability required of electronic switching centers and exchanges. Figures 2, references 5: 4 Russian, 1 Western.
[43-6900]

UDC 621.395.374

DESIGN FEATURES OF KVARTS QUASIELECTRONIC AUTOMATIC LONG DISTANCE TELEPHONE EXCHANGE

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 31 Jul 84) pp 8-11

VASILYEVA, I. I. and CHERKASOVA, P. S.

[Abstract] Design features of the KVARTS quasielectronic exchange equipment that must be taken into account when designing a particular exchange are outlined. The design of the line switching equipment, which together with the special-purpose control computer complex make up most of the volume and cost of the designed exchange, is emphasized. The method used to determine the number of line switching equipment modules, and the configuration of each module, based on the load to be handled is explained. The physical layout of the line switching equipment is discussed and types of cable connections employed are outlined. The functions of the testing equipment (one set per exchange) and power distribution equipment are described. Because no switchboard equipment has yet been developed for this exchange, provisions are made for using type MRU-M switchboards installed in the same building as the quasielectronic exchange. References: 8 Russian.
[43-6900]

COOPERATION IN COMMUNICATIONS BETWEEN GDR AND USSR

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 pp 5-7

CHIRKOV, B. I.

[Abstract] Cooperation in the area of communications between the German Democratic Republic and the USSR since the 1967 signing of a protocol between the GDR Ministry of Posts and Telecommunications and the USSR Ministry of Communications is considered. The 1967 plan encompassed practically all aspects of electrical and postal communications that were important in both countries at that time. The development of a consolidated electronic communications system in accordance with a USSR-GDR intergovernmental agreement of 21 May 1971 is described. Cooperation among USSR and GDR specialists in the Interkosmos space program is described. USSR purchases

of GDR-produced communications equipment, such as the ATS-54, ATSK, and ATSKU telephone exchanges over the past 20 years are discussed. Cited as another example of bilateral cooperation is the 1984 opening in Moscow of a technical center for repairing GDR-produced communications equipment.
[43-6900]

MOSCOW COMMUNICATIONS WORKERS SUPPORT 12TH WORLD YOUTH AND STUDENT FESTIVAL

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 pp 1-4

SMIRNOV, M. A. and ALTMAN, D. S.

[Abstract] This article describes the work being done by Moscow communications workers to provide communications support for the 12th World Youth and Student Festival which will require facilities in more than 200 locations. Television coverage will be relayed over existing central television links, and to foreign countries over 10 international TV channels. The provision of telephone service for participants and representatives of the press, both local and long distance, is described. The telegraph facilities to be used by journalists are outlined. The handling of postal money orders, registered mail, telegrams, etc., for hotel guests is described. The provision of public address and simultaneous translation facilities is discussed. Drawing on experience gained in the 1980 Olympic Games and the 1984 Druzhba Conference, the Moscow communications workers expect to be able to satisfy the demand for communications on the part of all participants in the Festival. Figures 4.
[43-6900]

MARGINS OF INTERFERENCE IMMUNITY

Moscow VESTNIK SVYAZI in Russian No 7, Jul 85 pp 34-36

FARBER, Yu. D., candidate of technical sciences, chief of laboratory, All-Union State Trust for Construction of Interurban Wire Communication Equipment

[Abstract] The interference immunity of line channels in analog signal transmission systems is analyzed, for the purpose of establishing the necessary signal levels measurable at terminals and maintainable by repeaters with given accuracy. Conventional calculations are refined by use of the relation for interference power P_1 as function of a single argument, the equivalent output signal level p, and as the sum of three components $P_1 = A \cdot 10^{-0.1p} + B_2 = 10^{0.1p} + B_3 \cdot 10^{0.2p}$ so that not only interference proper but also interference caused by quadratic and cubic nonlinearities is taken into account. According to this relation, the expected interference power is lower than the permissible one within some range of output signal level between p_{min} and p_{max}, at which cross-over levels becomes equal to

and beyond which on both sides it becomes higher than the permissible interference power, there being an output signal level p_0 within that range at which the expected interference power will be minimum. Calculations based on the corresponding third-degree equation $\partial P_{i(0)expect}/\partial p = 0$ and on that expression for $P_{i(0)}$, with coefficients A, B_2, B_3 known and with the output signal level stepwise (in 1 dB steps) increased from p_0 to p_{max} and decreased from p_0 to p_{min} for solution of that equation, will yield the margin of interference immunity for given values of channel parameters. These calculations must take into account the variance of channel parameters and, in the case of interurban telephone cables, fluctuations of the ground temperature. Figures 3.
[76-2415]

IMPROVEMENT OF QUALITY OF MECHANIZED CABLE LAYING

Moscow VESTNIK SVYAZI in Russian No 7, Jul 85 pp 36-37

RYBAKOV, A. P., chief of construction laboratory for construction or urban communication equipment, All-Union State Trust for Construction of Interurban Wire Communication Equipment

[Abstract] About 80-85% of all communication cables are now laid by the trenchless method, using the special hook-on tools KUK-5 and KUB-6. Two new tools for mechanized cable laying have been developed, as an improvement, the KNV-1 hang-on tool with a suspended pantograph and the KPKM hook-on tool with a hinged knife holder frame and rake angle regulator. These tools will better stabilize the embedment depth and prevent tension on the conductors as well as mechanical damage to the sheath, espedially one made of plastic material. An additional features of the KPKM tool is its smooth uniform motion. The design of both tools takes into account the mechanical characteristics of soil such as its resistance to cutting, which not only varies but is particularly high in the case of rocky or frozen soil. Although existing NKP-1D/2D knives are reliable, their wear resistance is limited and fast blunting is unavoidable. It therefore is necessary to provide for replacement of knife tips. It is also necessary to ensure a constant speed of cable drums as well as to provide the proper cable feed and unreel mechanisms. Although troughs are now used for protection of the cable sheath, special attention must be paid to adequate smoothing of their inside surfaces. another problem still to be solved is simultaneous laying of cable and armor. Figures 1.
[76-2415]

SUCCESSFUL IMPLEMENTATION OF FIVE-YEAR PLAN FOR CONSTRUCTION OF COMMUNICATION EQUIPMENT

Moscow VESTNIK SVYAZI in Russian No 7, Jul 85 pp 2-3

RAVICH, I. S., USSR Deputy Minister of Communication

[Abstract] Implementation of the 11th Five-Year Plan is nearly complete and preparations are to be made for the 12th Five-Year Plan. According to the directives of the 26th CPSU Congress, all construction and installation work on KM-19M-1, KM-90-P, KM-1Ye, KM-18Zh, KM-28, KM-60 cable communication trunk lines and RRL-109, RRL-300, RRL Tyumen-Surgut-Urengoy-Taz radio relay lines with a combined length of approximately 6000 km must be completed in 1985. During this year new and boosted transmitters are to be put in operation in the No 1 and No 2 centers for nationwide radio communication and broadcasting in facility 808. The capacity of the automatic telephone system is to increase by 1,368 thousand numbers with 130 thousand numbers to be added in Moscow alone. The program of this five-year plan for the Ministry of Communication also covers television communication and broadcasting, postal service, and newspaper teleprint. Delays caused by the All-Union State Trust for Construction of Interurban Wire Communication falling behind schedule are serious and the Main Administration of Material and Equipment Supply for the Ministry of Communication and the All-Union Administration of Communication Equipment Acquisition are to improve their procedures. It was pointed out at the April 1985 plenary session of the CPSU Central Committee that the goals of this five-year Plan should be completely achieved without corrective adjustments. For implementation of the next five-year plan, it is necessary that new procedures ensuring delivery of equipment on time and installation of equipment with maximum efficiency and labor economy be finalized before 1986. Some equipment, specifically SMZh-10 connectors for multipair urban telephone cables will be purchased in Bulgaria as well as produced by the Moscow State Trust for Construction of Telephone Equipment. Where necessary, personnel should be adequately trained and work should be properly organized with experience gained in this five-year plan serving as guide. Increasing financial and other incentives was recommended since a boost in the prestige of engineers and foremen will contribute to better work performance and better product quality.
[76-2415]

DEVICE FOR TUNING PERISCOPIC ANTENNA SYSTEMS

Moscow VESTNIK SVYAZI in Russian No 7, Jul 85 pp 32-33

FUKS, R. G., director, Communication Sector, Special Design and Manufacturing Engineering Office

[Abstract] A device for tuning periscopic antenna systems has been developed which consists of a directional antenna with circular polarization, a coaxial detector stage, and indicator stage, and accessories. The antenna is a regular cylindrical one of the traveling-wave type, with uniform spacing of elements, helical conductor, dielectric filler, and a discal reflector. The advantages of the indicator over a conventional microwave one are that it is not subject to metric-wave and decimetric-wave interference coming from the open end of a waveguide acting as a nondirectional antenna with linear polarization and does not therefore require tuning in two planes simultaneously with respect to maximum signal and maximum polarization. The indicator stage includes an amplifier and a recorder of the detected signal. It operates in either continuous-wave mode or, with the identification signal, in pulse mode. The amplifier has both coarse and fine grain control. Different antennas can be plugged in for different frequency bands. The device won the third prize in the competition sponsored by the Main Administration of Communication Equipment Construction. Figures 1; tables 1.
[76-2415]

MODERNIZATION OF SORTING MACHINE IN KIEV RAILROAD PARCEL-POST OFFICE

Moscow VESTNIK SVYAZI in Russian No 7, Jul 85 pp 38-39

NOVIKOV, V. A., senior engineer, Kiev Railroad Post Office

[Abstract] Six proposals have been submitted this year for innovating the conveyor of the sorting machine in the Kiev Railroad Parcel-Post Office. Two of them were described in VESTNIK SVYAZI No 6, Jun 85. The other four are described in this issue. They are: 1) a device for controlling the reference-information compiler, with a transistorized photocell-actuated circuit for flipping only loaded and not empty platforms; 2) automatic switching to "transit" mode when parcels from one bay must be sorted without flipping the platforms in another bay while compilers for both bays are involved in the operation; 3) device for limiting the idle operation of the sorting machine; 4) monitor of code recording on address carriers. All devices are designed with solid-state components and microcircuit chips. Figures 4.
[76-2415]

UDC 621.391

ASSESSMENT OF EFFECTIVENESS OF SELF-ORTHOGONAL CONVOLUTION CODES IN CHANNELS WITH INTERSYMBOL INTERFERENCE

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 14 Feb 84) pp 39-42

IVANOV, M. A., MAKARENKO, B. I., and YAKOVLEV, I. A.

[Abstract] The effectiveness of algebraically decodable self-orthogonal convolution codes for transmitting digital information over channels with intersymbol interference is evaluated. The potential effectiveness of convolution coding of digital messages is estimated by calculating the gain in transmission noise tolerance over a wideband channel, i.e., a channel with fixed intersymbol interference level independent of the code rate of the self-orthogonal convolution codes. The transmission quality of the coded information is characterized by the probability of erroneous decoding. The analysis indicates that the use of the highly effective, but extremely complex, probability decoding methods, especially Viterbi's algorithm, is justified only when convolution codes with relatively low code rates are employed. Algebraic decoding methods, which are simpler to implement, are more feasible for high speed convolution codes with redundancy not exceeding 15-20%. References 4: 3 Russian, 1 Western.
[43-6900]

UDC 621.395.1

USE OF UPS-9.6 MULTICHANNEL SIGNAL CONVERSION DEVICE TO FORM DIGITAL CHANNEL IN MULTIPLEXED TELEGRAPH SYSTEMS

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 9 Mar 83) pp 33-35

BLEYKHMAN, V. S., KOROP, B. V., KRASNOYARSKIY, V. S., MIKHAYLOV, V. F., SPIVAKAVSKIY, Ye. L., and TSVIGUN, A. V.

[Abstract] The basic technical characteristics of a multichannel parallel signal conversion device operating voice grade channels at 9.6 kbps are examined from the viewpoint of utilization in TDM telegraph systems. The signal conversion device is designed for use over leased voice grade channels and trunks, and is implemented as a half-set consisting of a transceiver with a common frequency spectrum generator that produces 48 frequencies, according to the number of frequency subchannels. These oscillations are employed as carrier frequencies in the transmitter and as references in the receiver. The multichannel signal conversion device can be used to set up a 9.6 kbps digital channel in a voice grade channel with quality sufficient for multichannel TDM telegraphy, as well as synthesized telephone, digital facsimile, etc. The synchronization

stability of the multichannel signal transmission device prevents it from influencing the reliability of TDM systems, which is governed only by the reliability of the voice grade channel. The digital channel formed by means of multichannel signal conversion device can serve as the basis for a TDM telegraph system that provides acceptable transmission reliability and accuracy for telegraph networks. Figures 3, references: 5 Russian. [43-6900]

UDC 621.391.24.037.372

CHARACTERISTICS OF ENERGY SPECTRA OF ALPHABET CODES WITH RELATIVE SIGNALS

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 29 Mar 84) pp 25-28

KOTIKOV, I. M.

[Abstract] The energy spectrum characteristics of alphabet codes employing the relative method for forming multilevel signals are investigated. In the relative method, the symbols of the alphabet code are converted to symbols of a relative alphabet code by modulo m addition (where m is the base of the code) of a given symbol in the alphabet code and the preceding symbol in the relative alphabet code. The multilevel signal is formed from the symbol of the relative code in a manner analogous with the absolute method, in which each code symbol is sent by a single pulse with amplitude corresponding to the symbol in question. The energy spectra of 3B2T and 6B4T type signals are analyzed by representing the multilevel signal as a uniform Markov chain with a finite number of states. It is found that the relative transmission method reduces the low-frequency components in the energy spectrum, regardless of the probability of occurrence of ones in the original binary signal. The energy spectra of alphabet codes using relative signals also contain no discrete components and, in particular, no constant component. The presence of the latter in the energy spectra of alphabet codes with absolute signals for $t \neq 0.5$ degrades noise tolerance and makes it necessary, e.g., to scramble the original binary signal, which increases many-fold the error propagation factor. These differences in the energy spectra of absolute and relative multilevel signals hold for all alphabet codes. Figures 5, references 10: 6 Russian, 4 Western.
[43-6900]

UDC 621.315.212

EXPERIENCE IN INTRODUCTION OF ALUMINUM-SHEATHED COAXIAL CABLES

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 2 Nov 84) pp 51-55

VORONTSOV, A. S., LEVINOV, K. G., NIKOLAYEV, G. P., and FROLOV, P. A.

[Abstract] The characteristics of KMA-4 and MKTA-4 aluminum-sheathed coaxial cables for mainline transmission are investigated. The behavior of the mechanical characteristics during stretching and transverse compression, as well as that of the electrical characteristics under conditions of commercial production, installation, and operation are investigated. KMA-4 cable, which carrier four 2.58/9.4 mm coaxial pairs and five star quads with 0.9 mm paper or polyethylene-insulated copper conductors, and MKTA-4 cable, which carries four 1.2/4.6 mm coaxial pairs and five balanced pairs with polyethylene insulated 0.7 mm copper conductors, have been in production long enough for most installation and wiring problems to have been solved, so that the volume of production and introduction of these cables can be stepped up. Figures 8, references: 7 Russian.
[43-6900]

UDC 621.315.23

DETERMINATION OF VOLTAGES AND CURRENTS IN CONDUCTORS OF COMMUNICATIONS CABLES WITH OPEN SHIELDING

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 24 Jan 84) pp 55-57

RAZUMOV, L. D.

[Abstract] The influence of external electrical and magnetic fields on communications cables with open shielding, such as wound strips or braiding, is investigated quantitatively by introducing a so-called "shield coupling conductivity" to allow for direct electrical coupling between the influencing line and the conductors of the cable through the shielding. Differential equations describing external influences on cable conductors are derived. The influence of a high voltage line on a buried communications cable running parallel is investigated as an example. The expressions derived make it possible to assess the influence of high voltage lines on communications cables employing braided, mesh, or strip shielding. Figures 2; references 5: 4 Russian, 1 Western.
[43-6900]

UDC 621.394/395

LABOR PRODUCTIVITY IN COMMUNICATIONS INDUSTRY IN LEADING CAPITALIST COUNTRIES

Moscow ELEKTROSVYAZ in Russian No 7, Jul 85 (manuscript received 21 Dec 82) pp 59-63

SHYLTSEVA, V. K.

[Abstract] Labor productivity in the communications industry is analyzed comparatively for the US, the FRG, France, and Great Britain. The main factors determining the dynamics of labor productivity are analyzed, including technical progress, utilization of labor resources, and improvement of the production structure of the industry. The decisive factors underlying the constant growth in labor productivity in the leading capitalist countries are found to include the fact that communications belongs to a branch that is given national priority while accelerated scientific and engineering progress and quick practical implementation of results, expanded international exchange of scientific achievements, and advanced structural modifications are all found to contribute to increased labor productivity. References: 14 Western.
[43-6900]

UDC 621.395.344

GENERAL INFORMATION ON KVANT QUASIELECTRONIC TELEPHONE EXCHANGES AND THEIR MODIFICATIONS

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 7, Jul 85 pp 3-6

DYUFUR, S. L., doctor of technical sciences, professor, Leningrad Institute of Rail Engineers, and LEBEDINSKIY, A. K., docent, candidate of technical sciences

[Abstract] Information is presented on the technical capabilities of KVANT quasielectronic telephone exchanges, which have begun to be implemented widely in the communications network serving rail transportation. KVANT exchanges employ ferreed connectors and electronic controllers. The switching equipment can be used to build terminal, node, and central exchanges, as well as automatic switching nodes. Terminal exchanges are used for internal connections between subscribers of a given exchange and external incoming and outgoing connections with subscribers at counterpart exchanges. Node exchanges differ from central exchanges in that only terminal exchanges are connected to node exchanges, while both terminal and node exchanges can be connected to central exchanges. Only trunks, that are used to make to terminal or tandem connections, are connected to automatic switching nodes. The interaction of KVANT exchanges with other types of exchanges is described. The procedures involved in setting up connections are explained. The construction of KVANT exchanges, and the diagnostic, backup, and power

supplies they incorporate, are described. The technical capabilities of the exchanges are outlined.
[56-6900]

UDC 658.011.22:656.254.16

TECHNICAL AND ECONOMIC ANALYSIS OF RADIO, INDUCTIVE, AND LOUDSPEAKER COMMUNICATIONS AND WARNING SYSTEMS

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 7, Jul 85 pp 6-10

VAVANOV, Yu. V., candidate of technical sciences, department head, VNIZZhT, DOTSENKO, N. Ye., chief, Radio Communications Department, Chief Directorate of Signal and Communications, Ministry of Railroads, and MALIEVSKAYA, Z. Yu., junior scientist, VNIZhT

[Abstract] A technical and economic analysis of radio, inductive, and loudspeaker communications systems is made in order to determine the feasibility of using various hardware for transmitting messages to mobile recipients depending upon the working conditions, the zones served, and the characteristics of the users. Two-way radio and inductive communications, as well as one-way radio, inductive, and loudspeaker communications are investigated. The quantitative relationship between the equipment cost, metal consumption, power consumption, and cable consumption is identified, and the initial indicators of radio, inductive, and loudspeaker communications are estimated. It is concluded that radio is the most promising method for warning workers within stations and on road sections. Loudspeaker public address is irreplaceable for passenger notification; inductive communications can be used for timely worker notification in enclosed spaces and also when all available radio frequencies have been exhausted, or when the area within which a message is to be sent must be localized.
[56-5900]

UDC 656.254.16:656.21

DESIGN OF FEEDER NETWORKS FOR TWO-WAY YARD PUBLIC ADDRESS SYSTEM

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 7, Jul 85 pp 16-17

KHANIN, A. I., chief specialist, Giprotrannsignalsvyaz Institute

[Abstract] This paper describes the connection of two groups of speakers to the same amplifying system in a two-way yard public address feeder network. Both groups may have the same, or different, rated voltages, and can be connected together permanently, or switched while the system is in operation. Block diagrams are presented showing each group of speakers with an independent two-wire circuit, and with a three-wire circuit with a

common conductor for both groups. A method is described for estimating electrical parameters during the design stage, which is based on the principle of load moments. The method can also be used to calculate the voltage distribution in existing feeder networks for purposes of integrity testing during scheduled maintenance.
[56-6900]

UDC 656.257.83:625.151.3

PPST-1.5 THREE-PHASE SWITCH CONVERTER

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 7, Jul 85 pp 10-16

KOGAN, D. A., candidate of technical sciences, chief designer, Chief Design Bureau, Chief Directorate of Signalling and Communications, Ministry of Railroads, and ETKIN, Z. A. and SPEKTRO, Ya. S., head designers

[Abstract] The PPST-1.5 converter, which is designed to provide backup power for three-phase MST-0.3 electric switch motors from a low voltage acid storage battery, is described. There are four versions of the three-phase converter, the basic technical data for which are presented in a table. The converters consist of a BP220 or BP380 converter unit and a BR relay unit. The physical layout and electrical circuits of the units are described; schematic diagrams of the divider-distributor, the pulse generator, and the capacitor unit are presented. The PPST-1.5 converters are in series production at the Ministry of Railroads Saratov Electrotechnical Plant.
[56-6900]

UDC 621.391

NETWORK OF RADIOELECTRONIC FACILITIES FOR MOBILE PLATFORMS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 28, No 7, Jul 85 (manuscript received 21 Nov 84 after revision) pp 66-67

VIKTOROV, A. D. and YEMELYANOV, A. G.

[Abstract] A network model is described for radioelectronic facilities controlled from a central console. A mobile platform equipped with the following radio facilities is analyzed: Duplex communications with one group of subscribers, simplex communications with another group, simplex communications from a third group to the platform, and active ranging and detecting for a number of targets, passing ranging and detection for a number of radiation sources, reception of television signals over a number of channels, and direction finding using signals from a number of beacons. These different

types of communications are represented by an unoriented graph, a graph oriented from the platform to the subscribers, and a graph oriented from the subscribers to the platform. The network model is shown to represent a formalization that is convenient for solving problems associated with integrating different types of radio communications, for automating design, and controlling radio operation. Figures 1, references 3: 2 Russian, 1 Western.
[39-6900]

UDC: 6621.371.029.65:551.59

METHODS OF PREDICTING STATISTICS OF ATTENUATION OF 10-100 GHz RADIO WAVES ON SLOPING LINKS IN RAIN

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 6, Jun 85 (manuscript received 25 Jan 83) pp 1071-1079

YERMAKOV, V. B., KOLOSOV, M. A. and POZHIDAYEV, V. N.

[Abstract] This work, the second part of a review article, studies the problem of computing the mean statistical probability of attenuation of radio waves in rain on sloping satellite communications links. The material is based on the first part of the article, with frequency references to tables and equations presented in Part One. Various methods which have been suggested for calculation of the attenuation statistics of radio waves on satellite communications links during rain are reviewed and results obtained using these methods with experimental attenuation data are compared. It is shown that the experimental data agree best with a method suggested by P. Misme in Radio Science, Vol 15, Number 3, 1980, Page 655. A calculation algorithm based on this method is then presented and the question of its application under the conditions of the USSR is discussed. Recommendations are given for means of increasing the accuracy of prediction of attenuation and further improvement of the method. Figures 3, references 17: 4 Russian, 13 Western.
[11-6508]

UDC: 621.39:519.22

STATISTICAL ANALYSIS OF PERIODICALLY CORRELATED RANDOM PROCESSES

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 6, Jun 85
(manuscript received 6 Jun 83) pp 1096-1104

YAVORSKIY, I. N.

[Abstract] Consistent estimates of the mathematical expectation, correlation function and variable spectral density can be constructed for periodically correlated random processes, a mathematical model successfully used to study the properties of signal and other phenomena with rhythmic structure. One method of formation of such statistics is based on the use of readings taken at time intervals which are multiples of the correlation period. This article analyzes the statistical properties of mathematical expectation and correlation function components for the case when the correlation period is not known. Methods of determining the period based on integral Fourier transforms are studied. Equations are obtained for the bias and dispersion of estimates of the period. Although the examples used in the article are based on use of a rectangular window, undesirable effects resulting from the side lobes can be reduced by selecting other windows optimal for the problems at hand. References: 10 Russian.
[11-6508]

UDC: 621.391

JOINT DETECTION AND RESOLUTION OF AN UNKNOWN NUMBER OF SIGNALS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 6, Jun 85
(manuscript received 6 Apr 84) pp 1131-1138

SHINAKOV, Yu. S.

[Abstract] The problem of separate measurement of the parameters of a number of signals is complex if the number of signals present is not known. This article studies the problem of detecting and measuring the parameters of an unknown number of signals against a background of fluctuation noise. The method of synthesis described in an earlier article by the same author is applied to signals typical for radar observations. Algorithms are synthesized and results presented from analysis of the quality of estimates obtained with the algorithms. One algorithm increases the resolution with respect to angular coordinates by a factor of 1.5 to 2.5 over the Rayleigh limit of angular resolution with a signal to noise ratio of each signal of 10 to 30 dB. The increase in resolution is obtained by complicating the algorithm for primary processing of the observed processes in all channels, although the transforms called for by the algorithm can be implemented on a special purpose digital processor. The method of synthesis presented can be used for the synthesis of resolution algorithms for other parameters in addition to angular coordinate, e.g., frequency and arrival time.
Figures 3; references 3: 2 Russian, 1 Western.
[11-6508]

COLLECTION OF INFORMATION FROM AUTOMATIC TELEPHONE SERVICE CONCERNING COST OF LOCAL TELEPHONE CALLS

Moscow VESTNIK SVYAZI in Russian No 9, Sep 85 pp 27-28

SHUR, V. A., candidate of technical sciences, chief of department, MONIIS (Moscow Branch, Scientific-Research Institute of Communications)

[Abstract] Telephone subscribers activate centralized equipment for periodic accounting of the cost of local telephone calls (APUS), which is located at each municipal automatic telephone service. Automation of the process of information collection from all APUS and transfer of it by communication channels directly to the center of information collection makes possible a "collection" subsystem which is ready for the introduction to municipalities of transfers to the periodic collection of local telephone calls. With the assistance of a block diagram, this paper describes the "collection" subsystem and the functions it fulfills. Figures: 1.
[88-6415]

NEW INSTRUMENT FOR CONTROL OF TENSION FORCES OF STEEL GUY CABLES FOR MASTS

Moscow VESTNIK SVYAZI in Russian No 9, Sep 85 pp 29-30

MAKHNOVSKIY, N. F., candidate of technical sciences, assistant professor of Department Faculty, Leningrad Institute of Railroad Transport Engineers (LIIZhT); and ALEKSEYEV, G. A., engineer of Territorial Center for Control of Long-Distance Communication and Television No 3

[Abstract] This paper is concerned with the control of forces in the guys of masts. At the present time, two methods of determining the tension forces of cables are in use: dynamic and static. A description is given of DN-LIIZhT dynamometers using the static method which are employed in the field. These devices were developed at the Leningrad Institute of Railroad Transport Engineers at the Beginning of the 60s (by one of the above authors, N. F. Makhnovskiy). Figures: 4.
[88-6415]

PROTECTION OF CABLES FROM DAMAGE BY FREEZING WATER

Moscow VESTNIK SVYAZI in Russian No 9, Sep 85 pp 30-31

LYAKHOVICH, I. F., RAK, S. M., and POLYAKOV, S. T., coworkers at th Kiev Branch of the Central Scientific-Research Institute of Communications (KONIIS)

[Abstract] This paper describes the development at KONIIS of a method for protectionof cables laid in frozen ground from damage by freezing water which penetrates the channel. The proposed method has been used for protection from damage of KMB-8/6 coaxial cable, laid in cable channels at four cities. Vulcanized rubber tubes laid in a channel parallel with the cable were used as compensators. The compensators reliably protected the cable: damage to the cable by freezing water was not observed over a period of 5 years. Tables: 1.
[88-6415]

STAND FOR REPAIR AND ADJUSTMENT OF KURS-4 RADIO-RELAY EQUIPMENT UNITS

Moscow VESTNIK SVYAZI in Russian No 9, Sep 85 pp 33-34

GETSYUK, Ya. M., senior engineer of Regional Administration of River Transport, Ministry of Communications, Ukrainian SSR; and RIKHTER, S. G., candidate of technical sciences, assistant professor, Institute for Further Training, Ministry of Communications, USSR

[Abstract] Repair of KURS-4 radio-relay equipment units, including substitution of semiconductor devices, should be conducted in a special-equipment laboratory with the assistance of stands and measuring devices. The following are considered: 1) Principal circuit of stand; 2) Block diagram of converter of microwave and intermediate frequency signals; and 3) Basic diagram of mixer for microwave and intermediate frequency signal converter. Figures: 5.
[88-6415]

PROTECTION OF UNATTENDED REPEATER POINT K-1020S EQUIPMENT FROM EFFECT OF LOW TEMPERATURES

Moscow VESTNIK SVYAZI in Russian No 9, Sep 85 pp 34-35

RLYKO, M. N., chief

[Abstract] This paper describes the construction by the Planning and Design Division of the Territory Administration Center for Long-Distance Telephone Communications and Television No 19 (TTsUMS-19) of a protective

well for an unattended repeater point station for the container of the K-1020S transmission system. Methods of protecting the K-1020S equipment from the effect of low temperature are considered. Monitoring measurements of the air temperature within the well in the 1983-1984 winter months showed that with a minimum temperature of the external air of -35°C, the temperature within the well was within the norm limits. During the winter of 1984-1985 with a minimum exterior temperature of -45°C, the K-1020S transmission system also operated normally.
[88-6415]

UDC: 621.395.4

TRENDS IN IMPROVEMENT OF MAIN ANALOG COMMUNICATIONS LINKS

Moscow ELEKTROSVYAZ in Russian No 6, Jun 85 (manuscript received 1 Mar 84) pp 1-3

BUTLITSKIY, I. M.

[Abstract] Analog communications lines are more effective than digital lines for the organization of large numbers of channels, so that these lines will be digitized last, over the next fifteen to twenty years. The use of the K-3600 system can allow organization of 3600 channels on systems now utilizing the K-1920 equipment. To improve the present situation, it would be possible either to increase the distance between K-3600 units to 4.5 km on coaxial cable lines, or increase the channel capacity of existing units without increasing the distance between relay stations. The latter path is preferable from an economic standpoint. The K-5400 equipment is suitable for this purpose, allowing the transition to the K-10800 equipment to be delayed and in some cases dispensed with entirely. Figure 1, references 15: 11 Russian, 4 Western.
[17-6508]

UDC: 621.391.1

PRINCIPLES OF CONSTRUCTION OF LINE CHANNEL OF IKM-1920x2 TRANSMISSION SYSTEM

Moscow ELEKTROSVYAZ in Russian No 6, Jun 85 (manuscript received 10 Jan 84) pp 4-8

SHKLYAR, B. Kh., TUNEV, D. G. and BEZMATERNYKH, N. F.

[Abstract] The hardware used in the IKM-1920x2 system is described, including the code converter, decoder, regenerator and correcting amplifier. The method used to test the correctness of the line signal at the end of the line depends on error correcting devices built in at the beginning and end of the line. A simplified design is used to reduce power consumption in these

devices. Test results of laboratory models of the major units in the digital channel have shown the possibility in principle of creating the apparatus based on the use of a nonblock balanced code allowing a line speed of 139,264 Mbit/s and the organization of 3840 voice frequency channels on 2 coaxial pairs. This is an improvement over the earlier K-3600 analog system. Figures 9, references 7: 6 Russian, 1 Western.
[17-6508]

UDC: 621.395.44:654.1.003

ESTIMATING EFFECTIVENESS OF USE OF D-AVU-10 TRANSMISSION SYSTEM

Moscow ELEKTROSVYAZ in Russian No 6, Jun 85 (manuscript received 7 Aug 79) pp 9-11

DAVYDOV, Yu. G., MYAGKOV, I. V. and PEROV, M. V.

[Abstract] A study is made of the problem of using the D-AVU-10 transmission system in urban telephone systems. The effectiveness is estimated on the basis of capital investment required, expansion of the capacity of the existing telephone network and savings of copper. The use of the D-AVU-10 in this situation can expand the capacity of the network by a factor of approximately 1.8 without additional line equipment, saving about 60% of the copper which would otherwise be required. At present, the use of the equipment would result in an increase in the cost of the subscriber network. However, there expansion of the network will shortly require laying of new cables or in cases where construction of the network with the minimum quantity of nonferrous metal is required, the use of the device is desirable. Figures 2, references 7: 5 Russian, 2 Western.
[17-6508]

UDC: 621.395.345

STUDY OF THROUGHPUT CAPACITY AND CALCULATION OF CHANNEL GROUP CAPACITY OF KVARTS QUASIELECTRONIC AUTOMATIC LONG-DISTANCE TELEPHONE EXCHANGE IN NETWORKS WITH BYPASS ROUTES

Moscow ELEKTROSVYAZ in Russian No 6, Jun 85 (manuscript recieved 17 May 84) pp 12-17

BONDAR, N. A., DEDOBORSHCH, V. G. and YERSHOV, V. A.

[Abstract] The Kvarts quasielectronic automatic long-distance telephone exchanges will become the main type of switching equipment produced for long-distance communications in the USSR during the twelfth five-year plan. The programmed control of these devices allows organization of automatic bypass, increasing the use of outgoing groups of channels, servicing quality and

reliability of the network. This article suggests a simplified method to determine the necessary number of attempts at establishing communications, estimation of the throughput capacity of the equipment and calculation of the capacity of groups of channels in networks with bypass routes. The computations show that the equipment can provide a throughput capacity of 0.65 erl per intermediate line with four attempts at establishing communications. The next stage is computation of the capacity of groups of channels considering not only servicing quality, but also the cost of channels on the communications network, a subject for a future article. Figures 7, references 10; 4 Russian, 6 Western.
[17-6508]

UDC: 621.376.65:681.84.081

TRANSMISSION OF WIDEBAND AUDIO BROADCAST SIGNALS THROUGH A SET OF PARALLEL DIGITAL CHANNELS

Moscow ELEKTROSVYAZ in Russian No 6, Jun 85 (manuscript received 22 Oct 84) pp 30-33

KOVALGIN, Yu. A. and SERGEYEV, M. A.

[Abstract] A study is made of a device for narrow band processing of high quality monophonic and sterophonic audio broadcast signals which can be used to transmit the signals through codecs with bandwidths of 10 and 6.4 KHz such as those used in satellite program relay systems. Processing involves filtration to separate the spectrum of the initial signal into two bands, below and above 10,000 Hz, separate transmission of the two bands after transposing the high frequency band downward, then reconstruction of the high fidelity signal. Results of experimental evaluation of channel quality are presented, showing satisfactory quality for stereophonic broadcasting. Figures 2, references 6: 4 Russian, 2 Western.
[17-6508]

UDC: 621.397.7

SOME TRENDS IN THE DEVELOPMENT OF FACSIMILE EQUIPMENT

Moscow ELEKTROSVYAZ in Russian No 6, Jun 85, pp 41-43

SAYFETDINOV, Kh. I. and VORONIN, O. A.

[Abstract] The resolution of modern facsimile apparatus is as high as 7-8 lines per millimeter, transmission of standard letter size documents as rapid as 30 to 60 seconds per page, thanks to the ability to process facsimile signals as digital signals, greatly decreasing the amount of data which must be transmitted. New laser, fiber optic and photoelectric charge-transfer-based scanning equipment has allowed further increases in image quality and

transmission speed. There is a bright future for facsimile transmission due to its good utilization of communications channels, great clarity and accuracy of transmission. References 6: 5 Russian, 1 Western.
[17-6508]

UDC: 681.3.053:621.397.121

COMPRESSING CAPACITY OF PLANAR CODING OF FACSIMILE IMAGES WITH CONTOUR SEPARATION

Moscow ELEKTROSVYAZ in Russian No 6, Jun 85 (manuscript received 5 Aug 83) pp 38-41

SHATS, Yu. Ya., BEREZOVSKAYA, I. B., DMITRENKO, A. P., ORLEVICH, I. D. and FROLUSHKIN, V. G.

[Abstract] A study is presented of the possibility of further increasing the compressing capacity of an existing planar code by prior contour separation, decreasing the number of black elements in the image. Abbreviated code representations are used to denote groups of black and white elements in common patterns. The procedures for separating contours are found to be an effective means of increasing the compressing capacity of the planar code, allowing the compression factor to be increased by 30-35%. No significant decrease in noise rejection is observed. Figures 4, references 3: 2 Russian, 1 Western.
[17-6508]

UDC 621.372

SYNTHESIS OF SYSTEMS FOR NONLINEAR DIGITAL SIGNAL PROCESSING

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 28, No 8, Aug 85 (manuscript received 26 Nov 84) pp 6-17

DANIE, A. A.

[Abstract] This paper appears in an issue of the above journal devoted to a general review of the problems of digital signal processing (DSP). The work presents and proves one of the possible general principles of nonlinear DSP that it is permissilbe to use as the basis of program-hardware realization of DSP devices and systems, as well as with the object of modelling DSP algorithms and systems on a computer. An essential moment of the theory is the explicit presentation of the structure of the approximating operator which makes it possible to determine the principal problems of DSP and to understand the role and place of previous developments in the general problem of nonlinear signal processing. Consequently, algorithms of fast transforms of

the Fourier type emerge in a new role - projectors - and their diversity is a resource during the solution of problems of optimizing the dimensionality of the space on which the input signals are projected. Recursive digital filters also appear in the new role. Figures 8; references 9: 8 Russian, 1 Western (in Russian translation).
[65-6415]

UDC 621.391:571.51

FAST MULTIPARAMETER TRANSFORMATIONS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received after revision 1 Aug 1985)
pp 18-26

LEBUNETS, V. G.

[Abstract] This paper appears in an issue of the above journal devoted to a general review of the problems of digital signal processing (DSP). The work proposes a new form of multiparameter transformations (MPT) which makes it possible to construct a specific class of nonlinear transformations with fast algorithms, and cites the results of an adjustment of an orthogonal MPT on the transformation F (t_1,t_2) in the base of the eigenvector of the Jacobi matrice, with the object of determining the corresponding fast algorithm. Figures 8; references 12: 8 Russian, 4 Western.
[64-6415]

UDC 517 + 681.3

FUNDAMENTAL SHIFT, CONVOLUTION AND CORRELATION THEOREMS FOR PROBLEMS OF DIGITAL SIGNAL PROCESSING

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received after revision 22 March 1985)
pp 26-31

KUKHAREV, G. A.

[Abstract] This paper appears in an issue of the above journal devoted to a general review of the problem of digital signal processing (DSP). The work cites a number of relationships and demonstrates the necessary theorems which determine the shift, convolution, and correlation in matrix treatment for an arbitrary basis of function systems, the results of which can be used directly in problems of DSP, during synthesis, analysis and realization of DSP algorithms and during the design of radioelectronic devices for signal processing. Figures 1; references 10: 8 Russian, 2 Western (1 in Russian translation).
[65-6415]

UDC 621.391.8

METHODS AND DEVICES FOR STEP-BY-STEP DISCRETE FOURIER TRANSFORM

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received after revision 20 March 1985)
pp 32-36

LEBEDEV, Ye. K., GALANINA, N. A., and LAPIY, V. Yu.

[Abstract] This paper appears in an issue of the above journal devoted to a general review of the problems of digital signal processing (DSP). The work considers methods and devices for a step-by-step discrete Fourier transform (SSDFT), and evaluates the increase of the number of orders and the transfer time in SSDFT as compared with a fast Fourier transfer (FFT). Devices for one-dimensional and many-dimensional SSDFT are considered. It is shown that the SSDFT methods and devices have an advantage in high-speed operation as compared with FFT. In addition, rounding off errors are substantially reduced in SSDFT. Many-dimensional SSDFT makes it possible to effect a transform with long lengths of N recording data. Figures 4; tables 2; references 5: 1 Russian, 4 Western in Russian translation.
[65-6415]

UDC 621.391.2

QUASI-NESTED ALGORITHM OF A FAST FOURIER TRANSFORM

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received after revision 2 Jan 1985)
pp 36-40

SVERKLIK, M. B., NAZARENKO, A. A., and TIKODRI-TOGBOA, S. S.

[Abstract] This paper appears in an issue of the above journal devoted to a general review of the problems of digital signal processing (DSP). The work proposes a quasi-nested algorithm of an n-point Fourier transform (FFT) which makes it possible significantly to increase the computation effectiveness of the algorithms of a FFT with a mixed base. Figures 1; tables 2; references 4: 3 Russian, 1 Western.
[65-6415]

UDC 681.3:517.443

FAST DISCRETE TRANSFORMATIONS IN BASES OF PIECEWISE-QUADRATIC FUNCTIONS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received after revision, 18 Feb 1985)
pp 40-45

ZENTSOV, V., and CHUPIK, R.

[Abstract] This paper appears in an issue of the above journal devoted to a general review of the problems of digital signal processing (DSP). With the object of using a piecewise-quadratic approximation in DSP, the work considers two systems of piecewise-quadratic base functions. Fast algorithms of direct and reverse spectral transformations in the bases introduced are described. The totality of the coefficients of divergence of the approximating processable signal of the piecewise-quadratic functions in these bases is intervening information for further digital processing with the use of fast algorithms of discrete transformation. Use of the piecewise-quadratic interpolation makes it possible to obtain in digital form a more precise description of a wide class of continuous processable signals. Figures 2; tables 1; references: 7 Russian.
[65-6415]

UDC 621.372.542:376.56

DIGITAL RECURSIVE FILTER WITH DELTA MODULATION

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received 21 June 1984) pp 53-58

POGRIBNOY, V. A., and YAVORSKIY, B. I.

[Abstract] This paper appears in an issue of the above journal devoted to a general review of the problems of digital signal processing (DSP). Methods of calculation, modelling on a computer, and construction of digital recursive filters (DRF), in which all magnitudes are presented in delta-modulation format, have not been developed. This restricts use of delta-modulation in realizations of DRF. Methods of calculation, modelling, and an alternate version of practical realization of DRF delta-modulation, obtained in an interrelation of pulse-code modulation and linear delta formats, are presented. Figures 2; references 8: 6 Russian, 2 Western.
[65-6415]

UDC 621.391.8

DIGITAL FILTRATION IN SYSTEM OF RESIDUAL CLASSES

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received after revision 10 Dec 84)
pp 58-62

LEBEDEV, Ye. K.

[Abstract] This paper appears in an issue of the above journal devoted to a general review of the problems of digital signal processing (DSP). The work considers devices for digital signal processing in a system of residual classes. A block diagram is examined of a digital device, operation of which is based on use of a non-positional number system. The statistical characteristics of a binary random sequence (RS) $X_S[KT]$ in the S-order, generating a Markoff RS of R-digit numbers x(kT) are described. Step-by-step quasi-optimum signal processing is discussed. It is shown that realization of digital filtration in systems of residual classes increases the fast response and reduces rounding off errors. The principal elements of the technical implementation of such filters are considered. Figures 1; references 6: 4 Russian, 2 Western (in Russian translation).
[65-6415]

UDC 621.372

SYNTHESIS OF NONLINEAR DIGITAL WIENER FILTERS FOR ONE CLASS OF SIGNALS AND NOISE

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received 15 Feb 1985) pp 63-69

DYAKONOV, V. N. and RASKOSNOV, M. A.

[Abstract] This paper appears in an issue of the above journal devoted to a general review of the problems of digital signal processing (DSP). In the work, solution of the problem (in mathematical terms) of the synthesis of a nonlinear digital Wiener filter is based on the results of the theory of synthesizing systems of DSP. An optimum nonlinear Wiener filter for a particular statistical situation is constructed as an example. Figures 4; references 8: 5 Russian, 3 Western (1 in Russian translation).
[65-6415]

UDC 621.373.187.4

TRANSIENT PROCESSES IN DIGITAL COMPUTING SYNTHESIZERS OF READINGS AT FREQUENCY CHANGES

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received 2 July 84) pp 69-74

FEDEYEV, A. N.

[Abstract] This paper appears in an issue of the above journal devoted to a general review of the problems of digital signal processing (DSP). The work is concerned with the treatment processes in digital computing synthesizers (DCS) of readings during change of the frequency codes. The effect is investigated of the type and number of compound elements of the filter on the character and duration of the transient process. The following are described: 1) A mathematical model of the DCS of readings; 2) Transient processes in DCS with second order filters including analytical expressions with the aid of which phase and frequency distortions are evaluated; and 3) Transient processes in DCS with ladder-type filters, including modelling on a computer and obtaining empirical formulas. Figures 4; tables 1; references 5: 3 Russian, 2 Western (1 in Russian translation).
[65-6415]

UDC 681.325.5

AUTOMATION FACILITIES FOR SIGNAL PROCESSING SOFTWARE DESIGN

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received after revision 21 Dec 84)
pp 74-78

ARTYUKHOV, V. G., MAKEYENOK, A. N., and GLUKHENKIY

[Abstract] This paper appears in an issue of the above journal devoted to a general review of the problems of digital signal processing (DSP). The work is concerned with an analysis of computer types, as well as the required supplementary apparatus and software, which can be used for automation of labor at various stages of applied software design for DSP. Recommendations are given with respect to a choice of computer and supplementary apparatus at the design stages. Tables 1; references 3: 1 Russian, 2 Western (in Russian translation).
[65-6415]

UDC 621.54.942.82

FAST LINEAR CONVOLUTION ALGORITHM BASED ON RECTANGULAR TRANSFORMATION

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received 15 Feb 1985) pp 84-86

TITOV, M. A., SHPENOV, M. N., and SAVIN, V. V.

[Abstract] This short communication appears in a special number of the above journal devoted to a general review of the problem of digital signal processing (DSP). The work is concerned with a problem basic to DSP: decrease of the volume of calculations on which the composition of equipment, power consumption, as well as the cost of devices realizing these computations, depend. Figures 1; tables 1; references: 12 Western.
[65-6415]

UDC 621.372.54:51.942.82

METHODS OF REALIZATION OF DIGITAL NON-RECURSIVE FILTERS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received after revision 2 Oct 1984)
pp 86-88

TIMOFEYEV, S. A., and LOTIN, V. V.

[Abstract] This short communication appears in a special number of the above journal devoted to a general review of the problem of digital signal processing. The work considers the case of replacement of the L shift registers of N-main memories with a capacity of M x B bits, where $L = M \times N$. A simplified block diagram is presented for a digital non-recursive filter for $L = 85$; $B = 8$; $N = 5$; and $M = 17$. Figures 1; references: 2 Western (in Russian translation).
[65-6415]

UDC 621.391.84

METHOD OF REDUCING PARAMETRIC ERRORS IN RECURSIVE DIGITAL FILTERS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received after revision 10 Dec 1984) pp 88-90

VLASENKO, V. A., and LAPPA, Yu. M.

[Abstract] This short communication appears in a special number of the above journal devoted to a general review of the problems of digital signal processing (DSP). A method is described in the work for reducing parametric errors in recursive digital filters (RDF), operating in a real time scale. The results obtained make it possible to recommend the use of the method and the developed RDF in devices for digital filtration of signals and images, devices with linear prediction, and in other fields. Figures 2; reference: 1 Russian.
[65-6415]

UDC 621.395.5:621.372.544

SYNTHESIS OF TRANSFER FUNCTIONS OF RECURSIVE DIGITAL FILTERS WITH COEFFICIENTS OF SPECIAL FORM

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 28, No 8, Aug 85 (manuscript received 15 Feb 1985) pp 90-92

BONDARENKO, N. N., and MITROFANOVA, T. S.

[Abstract] This short communication appears in a special number of the above journal devoted to a general review of the problems of digital signal processing. The work is concerned with the construction of radioequipment apparatus, where a wide range of signal processing problems can be solved with the assistance of domestic digital signal processors with analog lead-in lead-out devices. During the design of various such devices for digital signal processing, the principal development effort must be directed toward increasing processor productivity. As applied to recursive digital filters, one of the most effective methods of solving the problem is the synthesis of transfer functions with coefficients of special form and the design of such a type is described. Figures 2, tables 1; references: 3 Western (in Russian translation).
[65-6415]

DEVICE FOR REMOTE-CONTROL IDENTIFICATION OF FAULTY DISTRIBUTION FEEDER

Moscow VESTNIK SVYAZI in Russian No 8, Aug 85 pp 26-27

MOISEYEV, A. D., chief project engineer, GROBMAN, A. G., senior engineer, and FURMAN, N. Ye., senior engineer, Central Design Office

[Abstract] A telemetering system has been developed by both Leningrad and Cheboksar Urban Broadcasting Departments for the purpose of identifying a faulty distribution feeder in wire broadcasting networks during inspection and repair work, which usually begins in the transformer substation. This device fully utilizes the functional capabilities of existing UKTR-3 equipment and the STR-3 rack for transmission of failure signots to the central relay station. A most important feature is the use of forced feed of supplementary instructions by telephone call, to prevent automatic local feeder bypass and to allow encoding the number of a faulty feeder. A trigger-counter in the feeder monitoring module encodes feeder numbers in a binary code and oscillators in the STR-3 rack encode the number of a faulty feeder in a parallel frequency code, while UKTR-3 filters and lamps decode that number and indicate it on a display panel. Figures 2.
[7,-2415]

USE OF BUILT-IN HEAT PROBE AS ONE WAY TO REDUCE CAPITAL EXPENDITURES DURING CONSTRUCTION OF TRUNK LINES WITH K-24R COMMUNICATION EQUIPMENT

Moscow VESTNIK SVYAZI in Russian No 8, Aug 85 pp 25-26

GERASIMOV, A. M., chief engineer, and USHEROVICH, Ye. A., senior engineer, Central Scientific Research Institute of Communications

[Abstract] A heat probe buried in the ground next to the trunk cable serves as the sensing element for thermal remote automatic gain control from an unattended repeater station with K-24R communication equipment. The probe, inside a cast iron sleeve, is located 10 m away from the station house and connected to the control box through a TEB 4x4x0.4 cable. Moving this probe into the amplifier module and thus building it in directly into the control box would save an appreciable amount of digging labor and altogether reduce the construction costs. The feasibility of such a transfer of the probe from underground into the station house has been established by indoor and outdoor measurements made at three unattended repeater points, to determine how the temperature inside depends on the ground temperature and the ambient air temperature. Fluctuations of the indoor temperature were recorded on thermograms, revealing that at any time of the year the temperature inside the control box is 1°C above the room temperature and 4°C above the temperature of the ground at the cable embedment depth. Such small temperature differences make it unnecessary to modify the automatic gain controls for transfer of the heat probe, especially if the already small resulting regulation error is further compensated with the final frequency

at the terminal of the nearest attended repeater point as reference. Figures 2.
[77-2415]

OPTICAL COMMUNICATION LINES IN URBAN TELEPHONE NETWORKS

Moscow VESTNIK SVYAZI in Russian No 8, Aug 85 pp 30-32

BERLIN, B. Z., deputy chief engineer, and KHRYKIN, V. T., engineer, Leningrad Urban Telephone Network

[Abstract] Considering the advantages of fiber optics over conventional transmission lines, especially in contributing to the feasibility of an integrated digital communication system for the Unified Automatic Soviet Telecommunications Network, the first in the country experimental optical transmission lines was installed in 1980 between two automatic telephone exchanges in the Leningrad Urban Telephone Network. The line is 2 km long in three segments of stepped-index 4-fiber cable, each segment of the same factory length, spliced and wrapped in protective sleeves at the joints. The line operates at the 0.85 μm wavelength and at a speed of 8.5 (8.448) Mbit/s over 120 tone-freqency channels, according to CCITT recommendations, together with IKM-30 analog-digital and IKM-120 secondary intermittent group forming pulse-code-modulation equipment. Two years later in 1982, after extensive testing and engineering evaluation, a much improved version of this line with all necessary terminal equipment was put into service for pilot operation. On the basis of encouraging experience, another experimental optical transmission line was installed between two automatic telephone exchanges in the Leningrad Urban Telephone Network. This second line is a 2.5 km long graded-index 2-fiber cable operating at the 1.3 μm wavelength at a speed of 34 (34.368) Mbit/s over 480 tone-frequency channels, with the same IKM-30 and IKM-120/480 pulse-code-modulation equipment and terminal equipment. Its construction and layout details are either identical or analogous to those of the first line. Figures 3; tables 1.
[77-2415]

RELIABLE METHODS OF LOCATING CABLE INSULATION BREAKDOWN

Moscow VESTNIK SVYAZI in Russian No 8, Aug 85 pp 32-33

OYSGEL'T, M. G., chief engineer of laboratory, All-Union State Trust for Construction of Interurban Wire Communication Equipment

[Abstract] A plain Murray bridge with a 2-6 μF capacitor as 4 kV high-voltage pulse generator is used for locating the point of insulation breakdown before proceeding with cable repair, when the cable such as an MKS is symmetric. For locating the point of insulation breakdown on asymmetric coaxial cables such as KM or MKT cables is recommended addition of jumper loops, but the procedure must be further modified for identifying the cable pair under the highest breakdown voltage when all circuits have broken down and no intact cable pair is available for the loop test. The procedure then involves sequential switching of connections to the bridge through "auxiliary", "direct", "reverse" terminals. The distance from test point to breakdown point is measured most accurately by scanning the entire cable segment with both fault detector and tape measure or ruler. The latest model of such a high-voltage bridge set includes an electromagnetic or acoustic spark detector as attachment and, for still better accuracy, an interference suppressor consisting of a GT test generator and a ShchAV click pickup. Maximum compensation of interference signals is achieved by orienting the pickup for minimum test-signal reception, with almost no suppression of the useful test signal. The test signal can be a multiposition code and can be synchronized with triggering of the high-voltage pulse. Figures 2; tables 1.
[77-2415]

INTRODUCTION OF AUTOMATION INTO TECHNOLOGICAL PROCESSES AT TERRITORIAL CENTERS FOR CONTROL OF INTERURBAN COMMUNICATIONS AND TELEVISION

Moscow VESTNIK SVYAZI in Russian No 8, Aug 85 pp 15-17

SIGALOV, V. Z., deputy chief, BERLIN, L. B., chief of workshop, ALEKSANDROV, V. M., senior engineer, and NEFEDOV, V. N., chief of laboratory, TTsUMS-23 TERRITORIAL Center for Control of Interurban Communications and Television

[Abstract] An apparatus for automatic monitoring of communication projects (KAKOS) is being developed at the TTsUMS-23 territorial center for control fo interurban communications and television. Three modifications are considered, each having different functional capabilities and, therefore, containing different components. They are being introduced into line-equipment workshops for monitoring channels and equipment, displaying and documenting any changes in their status, and transmission of relevant data over the telegraph channel. The latest version is based on the commercially available SM-1800 microcomputer with a DZM-180 printer, a

VTA-2000-30 display, and a flexible magnetic disk memory. An interface containing an SM-1800,8501 modem and a UPS 50/200 or any other asynchronous modem couples the microcomputer to the telegraph channel. The software facilitates periodic collection of 250 ms long signals from up to 2000 2-position ("normal"-"trouble") sensors for further processing, with elimination of all spurious shorter signals and with flexible logic for individual requirements, including anticipation of trouble and confirmation of fault, determination of causes, display and documentation, interlocking and clearing channel inspection during repairs, also recording date and time. A similar version is based on an Elektronika S5-21M microcomputer capable of 180,000 operations per second, with programs stored in a 16 kbyte permanent memory of two Elektronika S5-2113 modules, and an Elektronika S5-2105 microcomputer with a 32 kbyte direct-access memory for processing and storing secondary or intermediate data. It includes a control panel for a signal channels multiplexer with an Elektronika S5-2102 microcomputer, a video monitor with an Elektronika S5-2106 microcomputer, and two Elektronika S5-2103 microcomputer modules for interfacing with the RTA telegraph transmitter and the telegraph channel, all together with the power supply built into the technical-service console. One such KAKOS set is already operating in one of the TTsUMS-23 projects. Five other sets, with Elektronika S5-12 microcomptuers and limited-capacity low-speed memories are operating in projects which require data acquisition, transmission, and printout only. Development of additional capabilities is now underway, these including pickup of instructions and textual data over a communication channel, hook-up to the Perekat automatic channel switching apparatus, automatic preparation of project descriptions according to a special program, an increase of the number of monitorable equipment components to 500, collection of signals over 3 s period, and an interlock not only for inspection of channels but also for inspection of equipment components. Figures 2.
[77-2415]

UDC: 621.396.96:621.391.26

MULTIPLE-SIGNAL SPIN ECHO PROCESSOR CONTROL

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian
Vol 28, No 7, Jul 85 (manuscript received 3 May 84) pp 922-925

IL'INA, Ye. A., KOVALEVSKIY, M. M. and USTINOV, V. B., Novgorod Polytechnical Institute

[Abstract] A study is made of the effect of five arbitrary finite signals on a spin echo processor. For simplicity of calculations, it is assumed that the signal length is significantly less than the relaxation time, while the intervals between signals are comparable to the relaxation time. It is shown that some operations in echo processors can be performed more simply with an increase in the number of control signals than was previously

thought. The possibility is demonstrated of correlation processing of signals whose lengths are greater than the relaxation time of the processor. The method suggested can be used to expand the range of signals which can be processed in spin echo processors. Figures 4, references 9: 7 Russian, 2 Western.
[8-6508]

/9835

UDC: 621.3.049.77:621.373.8

POSSIBILITY OF LASER SOLDERING WITH SHORT PULSES

Moscow RADIOTEKHNIKA in Russian No 7, Jul 85 (manuscript received 11 Jul 84) pp 89-91

GALANYUK, T. V. and KULAKOV, N. Yu.

[Abstract] The productivity of laser soldering of electronic devices to printed circuit boards can be increased by the use of lasers radiating in short pulses. This work presents a study to determine the minimum pulse length of laser radiation sufficient to support the soldering process, allowing melting of the solder and its flow over the surface of the parts to be joined. It is found that when pulses 6 ms in length are used, good flow is achieved of solder balls less than 1 mm in diameter. As ball daimeter increases from 0.5 to 1 mm, the necessary pulse energy increases from 0.8 to 2 J. Decreasing pulse length to 3 ms resulted in poorer flow even for 0.5 mm solder balls. The use of lasers generating short pulses to solder electronic elements to printed citcuits can significantly increase productivity and decrease the expenditure of energy per operation. Significant reduction in pulse energy allows this method to be recommended for soldering of heat-sensitive devices. Figures 4, references 9: 6 Russian, 3 Western.
[10-6508]

/9835

UDC 681.327.68

SOME REQUIREMENTS FOR SUBSTRATE OF INFORMATION CARRIER IN OPTICAL MEMORY WITH BINARY DIGITAL REPRESENTATION OF DATA

Novosibirsk AVTOMETRIYA in Russian No 4, Jul-Aug 85
(manuscript received 14 Aug 84) pp 70-76

LOMAKIN, V. I. and MOTRUK, O. N., Kiev

[Abstract] Transparent substrates are effective means of mechanically protecting the information carriers in optical memories with binary digital representation of data, but they must not defocus the recording laser beam nor lower the packing density and reduce the fidelity of write and read. These requirements impose limits on variation of the substrate layer thickness and of the refractive index of the substrate material. The tolerances on both variations are readily established for monochromatic recording light, upon stipulation of a zero residual aberration along the axis of the focusing objective at nominal thickness and refractive index of the substrate. A zero wave aberration at the aperture edges is then stipulated for determining the tolerance on thickness variation, whereupon this constraint also yields the relation between compensatory defocusing and deviation of the refractive index from nominal for any given substrate layer thickness. All calculations have been programmed for a computer. Numerical results for three wavelengths of recording light (0.5, 0.63, 0.87 μm) and objectives with large aperture (A = 0.95) indicate that optical glasses such as K8 satisfy the limits on variation of the refractive index so that variation of the thickness remains the critical factor in the design of substrates with such a material. Figures 6; references 12: 5 Russian, 7 Western (3 in Russian translation). [75-2415]

UDC 621.382:621.3.087.25

SOME PARTICULARITIES CHARACTERIZING PERCEPTION OF DOTTED IMAGES

Novosibirsk AVTOMETRIYA in Russian No 4, Jul-Aug 85
(manuscript received 10 Jul 84) pp 94-96

ISKHAKOVA, L. K., MOLOTOVA, A. Yu. and SHCHUKIN, I. V., Moscow

[Abstract] A study was made pertaining to the psychophysical aspects of perception of dotted images in the course of their structural analysis. Experiments were performed with a 250x250 mm^2 image format, images containing 100 groups of dots 3 mm in diameter with a Poisson distribution of the group centers. Each group constituted a double-exposure pair, with the dots located at the vertices of equilateral triangles or of squares, and was oriented either vertically or horizontally. Black-and-white images and color images on positives and on negatives were used in the study, with the 100 subjects either having or not having a priori information about the image structure. The results of this study have yielded some guidelines as to how most expediently analyze the structure of dotted images by various automatic methods, depending on both surface and volume concentrations of photographed particles, mean distance between two images of double-exposure pairs, and dimension of particles in the direction perpendicular to the projection plane. Figures 3; references: 3 Russian.
[75-2415]

UDC 681.325:621.376

OPTIMUM PROCESSING OF DATA ON OPTICAL VECTOR FIELD

Novosibirsk AVTOMETRIYA in Russian No 4, Jul-Aug 85
(manuscript received 18 Oct 84) pp 40-45

BAKUT, P. A., VOLPOV, A. L. and ZIMIN, Yu. A., Moscow

[Abstract] Statistical analysis of optical data in the scalar approximation, based on probability density functionals, can be refined so as to account for the vector nature of electromagnetic waves and thus also include polarization of light as well as change of polarization upon reflection by objects. An optical vector field in the aperture plane of a receiver is considered which consists of mutually orthogonal components of the reflected light and mutually orthogonal components of a fully noncoherent depolarized additive noise. The complex amplitude of the reflected field is regarded as that of a field which has passed through an interference filter and has been averaged over a period much longer than its own oscillation period. The corresponding probability density functional is formulated on this basis and the optimum data processor is constructed, assuming an isotropic reflector or a mirror surface. Optimum processing, namely matched vector filtration, is achieved better by simultaneous

holographic filtration of both space components of the field in a medium which gives a vector response than with separate Van der Lugt holographic filters for each. Figures 2; references: 6 Russian.
[75-2415]

ON WAY TOWARD PAPERLESS TECHNOLOGY

Moscow RADIO in Russian No 9, Sep 85 pp 14-16

GRIGORYEVA, N.

[Abstract] Microfilms and microfiches have already become a well established conventional component of all public information centers such as libraries and archives, the main two incentives for expanding and developing this technology being the tremendous space saving and the high cost of increasingly scarce paper. The latest invention is the ultramicrofiche, a square card 60 x 60 mm onto which 1000 frames of text can be transferred after x150-200 reduction. One such card contains the entire history of the CPSU, and the complete set of Lenin's writings in 55 volumes occupies the space of a single notebook. While until recently all microfilming and micro-photographing equipment was purchased from abroad, since recently such equipment is being developed at the Special Design Office of the All-Union Institute for Scientific and Technical Information. The newest model is the Rifma-2 operating either alone or with a computer, magnetic tape being used for interfacing and data storage in the latter case. Its capability is comparable to that of a highly educated expert who knows and uses many languages but can communicate by gesticulation only. Its speed is such that it can record and process data coming simultaneously from five YeS-1060 computers or from ten SM-4 computers. The machine reads the magnetic tape and transmits the coded data onto the screen of an 18LK7A miniature cathode-ray tube, from which they are photographed by a special universal camera with the appropriate reduction onto a film. A drive mechanism attached to the camera moves the film into successive positions as the magnetic tape is read. The machine can handle many print and script symbols when operating directly, their descriptions (graphems) being stored in its memory and being easily corrected when necessary. Reprographing equipment developed at the Special Design Office includes the ChKP12-1 electrophotographic machine already commercially built at the Votkinsk Radiotechnical Equipment Manufacturing Plant, also the Pusk for automatic program-controlled scanning of microfiches and producing copies on electrophotographic paper, and the Kadr-1 with a built-in microprocessor and producing copies on plain paper. The standard microfilming process produces black-and-white microfiches even when the original is multicolored. A color microfiche can be produced by a special Kodak process, but the cost of producing it is 20 times higher than that of producing a black-and-white one. A much less costly method has been proposed by candidate of technical sciences A. Z. Kan. It is based on the classical principle of color separation, by means of three filters (blue, red, green), and subsequent superposition of the three successively taken pictures in a synthesizer. The Spektr-1 synthesizer of color images from

black-and-white microfiches, with a reflecting screen onto which the three frames are projected, is particularly suitable for polygraphic automated production of multicolor material. Adaptation of the paperless technology for professional or personal use by an individual is also possible, just like a home computer terminal and a home video terminal, but can be expected to happen only some time in the near future. Figures 5.
[37-2415]

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UDC: 621.397.13:656.021

ORIENTATION OF ROBOTS AND THE BLIND BY MEANS OF TELEVISION IMAGES

Moscow RADIOTEKHNIKA in Russian No 7, Jul 85 (manuscript received after revision 11 Nov 84) pp 13-18

LEBEDEV, V. V. and YELISEYEV, V. A.

[Abstract] A brief history is presented of the efforts to assist the blind by the use of television images transmitted through nonvisual sensory channels. Estimates are presented of the required information transmission rate to a blind person or robot to allow orientation and movement on the street, through passages and in corridors inside buildings. The estimates of the volumes of input and output information required indicate that today's microprocessors are sufficiently powerful to process the information flow in real time. The method of guidance suggested is based on very simple recognition of straight lines with subsequent reconstruction of a limited class of patterns including sidewalks, streets, walls and posts. Only landmarks must be recognized, the remainder of the image being perceived without recognition necessary. A recurrent signal-processing procedure significantly decreases required memory capacity. Systems for the blind and for robots diverge at the level of information presentation: the blind require a tactile screen, which has not yet been invented. Figures 3, references: 12 Russian.
[10-6508]

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UDC 551.501.724:621.396.96

USE OF OPTIMUM MARKOV FILTRATION IN OPTICAL PROBING OF ATMOSPHERE

Novosibirsk AVTOMETRIYA in Russian No 4, Jul-Aug 85
(manuscript received 11 Feb 84) pp 46-51

GLAZOV, G. N., GLAZOV, Gr. N. and IGONIN, G. M., Tomsk

[Abstract] A monostatic pulse lidar is considered for probing an atmospheric layer of thickness $Z = [z_0, z_m]$ (z_0- altitude of lower boundary, z_m - altitude of upper boundary) with a receiver which operates in thephotodetector-current mode. The receiver is tuned either to the lidar wavelength λ_0 with Z within a 27-40 km wide zone of stable air purification or to the wavelength Q of Raman scattering by nitrogen with Z within the photodetector operating current range. Scattering by aerosol and resulting signals are assumed to be negligible in both cases. The temperature, as well as other properties of the atmospheric layer, is a random function of altitude z and its fluctuations are describable as a Markov process. Determination of its profile is based on a stochastic model of signal and noise in which, by virtue of the central limit theorem, deviations from the average constitute an almost Gaussian process regardless of their probability distribution. The problem is to optimally estimate the state vector as a function of time from the set of input signals, the a priori stipulated profiles of average temperature, and the given system constants including the effective duration of the probing pulse. A processing of input signals is devised for estimating the maximum of the a posteriori probability density, this processing being quasi-optimum filtration with adaptation. The efficiency of the algorithm is demonstrated by numerical calculations pertaining to a lidar using an excimer laser (λ_0 = 0.35 μm) which emits probing pulses of 5.33 μs duration into an atmospheric layer above the 200 m altitude with a 13 km long range of meterological visibility. The method of data processing is applicable to density profiles and other profiles. Figures 2; tables 1; references: 7 Russian.
[75-2415]

UDC 543.4

ESTIMATING WAVEFRONT OF OPTICAL RADIATION

Novosibirsk AVTOMETRIYA in Russian No 4, Jul-Aug 85
(manuscript received 2 Jun 84) pp 51-55

LAVRENTYEV, V. V., RYABOV, V. V. and SMIRNOV, G. V., L ..ingrad

[Abstract] The problem of reconstructing an optical wavefront, for analysis of radiation patterns or synthesis of radiation sources, is solved by estimating it in terms of series of parametric realizations by the method of least squares, assuming that the wavefront constitutes a three-dimensional surface describable by a polynomial model. Such an estimate is based on measurement of local slopes with a Hartmann probe. Since each realization of a wavefront is measurable only once, the adequacy of any model can be established only with the aid of additional a priori data and not by comparing an estimate which depends on that model with an estimate of the disperions which characterizes a sequence of readings at every point of the map and thus not dependent on the model. The amount of necessary additional data is minimum if one assumes a Gaussian distribution of measurement errors. The adequacy of a model is indicated by an inequality which either classifies that model according to the adequacy criterion when the dispersion σ^2 of single-measurement error is known, or classifies the conditions of measurement according to that criterion when σ^2 is not known. This method wavefront estimation is demonstrated on a numerical example, slope measurements having been made using a Hartmann probe with 5x5 holes in a square mask. At a $\alpha = 0.1$ significance level, a quadratic model of the wavefront was found to be adequate when $\sigma^2 > 6.6 \cdot 10^{-3}$ and a cubic model of the wavefront was found to be adequate when $\sigma^2 > 6.0 \cdot 10^{-3}$. The error of an estimate was zero at the origin of coordinates and maximum at the corners of the mask. Figures 1; tables 1; references 3: 1 Russian, 2 Western (1 in Russian translation). [75-2415]

UDC 772.99:681.327.5

INTERFERENCE IMMUNITY OF HOLOGRAMS IN HOLOGRAPHIC MEMORY

Novosibirsk AVTOMETRIYA in Russian No 4, Jul-Aug 85
(manuscript received 6 Apr 84) pp 61-70

DOMBROVSKIY, V. A., DOMBROVSKIY, S. A. and PEN, Ye. F., Novosibirsk

[Abstract] The fidelity of a holographic memory is evaluated in terms of immunity to interference from defectiveness of the information carrier. The dependence of the statistical characteristics of the reconstructed image on the number, the size, and the location of amplitudinal microdefects in the Fourier hologram is analyzed for this purpose on the basis of theoretical relations applicable to recording with a 2-level random phase mask, in the approximation of Gaussian reconstructing, signal, and

reference light beams. The intensity distribution over the reconstructed image is determined accordingly, whereupon the average optical "1" and "0" power input to the central photoreceiver $P^{(1,0)}$ is calculated in terms of its mathematical expectation $M[P^{(1,0)}]$ and dispersion $D[P^{(1,0)}]$ in accordance with the theorem of addition and multiplication for characteristics of independent random quantities. The mean image contrast is then $C = M[P^{(1)}]/M[P^{(0)}]$ and the signal-to-noise ratios are then

$(S:N)_{1,0} = M[P^{(1,0)}]/\sqrt{D[P^{(1,0)}]}$. The fidelity index at the optimum power threshold is obtained next, assuming a normally distributed probability density of power and including the error integral as well as correction factors for defectiveness of a real hologram. Numerical calculations for a typical photoreceiver array indicate the upper limits on the number and the relative size of defects not to be exceeded if the probability of readout error is to remain sufficiently low, usually below 10^{-6}. The main items in this article were presented at the fourth All-Union conference on holography in Yerevan, May 1982. The authors thank I. S. Gibin and P. Ye. Tverdokhleb for reading the manuscript with helpful discussions and comments, also V. I. Kulibaba and A. A. Blok for assisting in the study.
Figures 3; references 6: 4 Russian, 2 Western.
[75-2415]

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UDC 621.315.616.97.001.45

METHOD FOR TESTING POLYMER MATERIALS FOR TRACKING AND EROSION RESISTANCE

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian No 5, May 85 (manuscript received 13 Oct 83) pp 65-66

GUSEJNOV, G. A., Leningrad Order of Lenin Polytechnical Institute imeni M. I. Kalinin

[Abstract] A quick method is proposed for testing specimens of polymer materials for tracking and erosion resistance by immersing them in a solution of electrolyte and then applying high voltage outside the bath. The specimens to be tested are secured between metal elctrodes at least 2.5 cm apart. An electrical field strength of the order of 0.7 kV/cm is employed, using an electrolyte with resistance of the order of 12 ohms·m. The proposed method makes it possible to select from a wide assortment of polymer materials those that are most resistant to tracking and erosion for making high voltage insulation. Figures 2, references: 4 Russian.
[299-6900]

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ELECTROMAGNETIC COMPATIBILITY

SEVENTH INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY

Moscow ELEKTROSVYAZ' in Russian No 7, Jul 85, pp 63-64

BYKHOVSKIY, M. A., KALASHNIKOV, N. I., and POLOZOK, Yu. V.

[Abstract] The Seventh International Symposium on Electromagnetic Compatibility held in July 1984 in Wroclaw is summarized. The symposium was organized by the CCIR, the International Scientific Radio Union, and the International Special Committee on Radio Interference, and included two hundred individuals from 28 countries and international organizations. 107 reports were delivered and discussed in 19 sections: Radio network planning and spectrum utilization; computer applications for electromagnetic compatibility problem solving; investigation of utilization of computers in radio communications systems and networks; experimental and theoretical research on characteristics of radio facilities that determine electromagnetic compatibility; man-made radio interference; investigation of electromagnetic situation by means of special instrumentation; study of effect of electromagnetic radiation on wire communications systems and biological and other objects. Selected reports associated directly with ensuring electromagnetic compatibility in various communications and broadcast systems are outlined in brief. The reports presented at the symposium have been published in two volumes of symposium proceedings that are available, inter alia, in Moscow at the State Public Scientific-Engineering Library.
[43-6900]

UDC: 551.594.21:551.507.352

DETERMINATION OF LIGHTNING DAMAGE TO AN OBJECT

Moscow ELEKTRICHESTVO in Russian No 7, Jul 85 (manuscript received 28 Dec 84) p 72

LARIONOV, V. P., KOKUPKIN, M. P., MOSOLOV, A. Ye., PROKHOROV, Ye. N. and SERGIYEVSKAYA, I. M., Moscow Institute of Power Engineering

[Abstract] Studies of the potential lightning damage to individual parts of aircraft are usually performed by cumbersome laboratory experiments on

small-scale models using spark discharges created with a pulsed voltage generator. A significant reduction in labor and time can be achieved by using a high-frequency high voltage source applied to the model. The corona discharge at 10 to 100 kHz can be observed visually even in a lighted room. As the voltage is increased, corona zones are visually observed and voltages at which the corona appears on various elements of the model are noted. When the voltage has been increased by a factor of 1.5 to 2 over the voltage at which the first corona appears, coronas cover virtually all zones subject to lightning damage and the experiment can be concluded. Assuming that the probability of damage of any element on the model is inversely proportional to the number of such elements, equations are produced for the probability of damage to an element. A table presents average probabilities of damage to parts of aircraft based on published usage and laboratory experimental data. It is noted that results are close to those achieved by the high voltage and spark model methods. References: 3 Russian. [35-6508]

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UDC 621.391.837.13

SELECTION OF ZONES FOR CORRECTION OF BEAM DEFLECTION ERROR IN CATHODE-RAY TUBE BY NODE-INTERPOLATION METHOD

Novosibirsk AVTOMETRIYA in Russian No 4, Jul-Aug 85
(manuscript received 6 Jul 83) pp 56-61

GRITSKIV, Z. D. and SNITSARUK, L. A., Lvov

[Abstract] Correction of the beam deflection error and of the resulting spot astigmatism in cathode-ray tubes is considered, the node-interpolation method with the use of function converters offering certain advantages such as simplicity and precision. A corrective signal is shaped according to a given law, usually representing a continuous function with sign reversing second derivative in one quadrant of the image field, and fed into the deflection amplifier channel. The main structural components of such a corrective system are address registers, an interpolator, switches, and an analog memory. The accuracy of a correction will depend on the word length q of the control codes and thus on the number of zones $N = 2^q$ into which the image field has been subdivided along each coordinate. At the same time, lengthening the control codes will increase the number of nodes even more than the number of zones and thus require increasing the capacity of the analog memory. This will in turn complicate the circuitry and the tune-up. There arises then the problem of tradeoff and zoning optimization, which must take into account that the beam positioning error is relatively small at the center of the field and increases toward the edges. Subdivision into equal zones is considered first and the error of a linear correcting function is evaluated accordingly, by comparing it with ideal correction, whereupon the maximum error is compared with the permissible one. The beam deflection error is determined not only by the distortion factor and the deflection angle but, inasmuch as two coordinates are involved, by the mutual compounding effect. In turn, the deflection error produces not only a positioning error but also a nonlinearity of deflection with attendant variation of the velocity at which the spot moves across the screen. These problems can be minimized by nonuniform subdivision of the image field and by interpolation, namely equating the approximating function to the correcting function not at the nodes but at intermediate points within unequal zones. Figures 4; references 6: 4 Russian, 2 Western.
[75-2415]

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UDC 520.274

TWO-CHANNEL PHASE-SWITCHING INTERFEROMETER

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 6, June 85 (manuscript received 11 July 84) pp 788-790

PANADZHYAN, V. G., Byurakanskaya Astrophysical Laboratory, Academy of Sciences, Armenian SSR

[Abstract] A proposed two-channel phase-switching interferometer consists of two phase-switching interferometers, antennas A and A_2, a double phase switch, and two identical amplification channels, and signal converters. (A block diagram of the device is presented.) As compared with a conventional phase-switching interferometer, the proposed device, in addition to increased sensitivity, has a greater reliability. The author thanks V. A. Sanamyana for participation in a discussion. Figures 2; references 2: 1 Russian, 1 Western.
[38-6415]

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UDC: 621.318.43.012.8.001.24

CALCULATION OF WEBER-AMPERE CHARACTERISTICS OF REACTORS BY THE USE OF MAGNETIC CIRCUIT SYSTEMS

Moscow ELEKTROTEKHNIKA in Russian No 5, May 85
(manuscript received 26 Sep 83) pp 41-46

BLAVATSKAYA, N. A., engineer, LEYTES, L. V., candidate of technical sciences,
All-Union Institute of Electric Engineering imeni V. I. Lenin

[Abstract] A procedure is suggested for developing a method of calculating the inductance or Weber-ampere characteristics of a reactor by subdividing the problem into a sequence of simpler ones. The course of development in accordance with the sequence is then described for a specific computation method for the most common type of structure, a two-rod reactor with gaps. Reactors of other types are no more difficult to design using the method. The recommended sequence of computation is as follows: formulate the parameter to be calculated, such as static, dynamic or equivalent inductance; write down the assumptions used, the list to be supplemented as necessary; produce a drawing of the reactor and indicate positive directions of MMF, currents and magnetic fluxes; add to the drawing the proposed magnetic field of the reactor; simplify the picture of the magnetic field by representing lines of force and magnetic equipotentials as a set of sections of plane, cylindrical or spherical surfaces; compose a system of magnetic circuits corresponding to the simplified magnetic field picture; design the magnetic circuits, then go over from their parameters to the parameters of the electrical circuit; represent the equation obtained as the major inductance component by algebraic transforms. Figures 6, references: 8 Russian.
[19-6508]

UDC 621.9.048.6

OUTLOOK FOR REPLACEMENT OF MAGNETOSTRICTIVE TRANSDUCERS WITH PIEZOCERAMIC ONES REQUIRING MODULAR OSCILLATORS

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 85
(manuscript received 15 Oct 84) pp 61-62

BABIKOV, O. I., doctor of technical sciences, BEZMENOV, F. V., candidate of technical sciences, and SHUKKEL, Yu. F., engineer, All-Union Scientific Research Institute of High-Frequency Currents

[Abstract] Replacement of magnetostrictive transducers in industrial ultrasonic treatment plants with piezoceramic ones is necessitated by the high cost of magnetostrictive materials (Permendur), intricacy of their heat treatment and of the forming operations, wide variation of acoustic characteristics caused by unavoidable variations in the manufacturing process, low efficiency, need for ultrasonic-frequency magnetizing equipment and need for a cooling system. The two main obstacles to introduction of piezoceramic transducers so far have been unavailability of high-efficiency piezoceramic materials and unavailability of technologically feasible transducer configurations for adequate for high-power high-frequency vibrations with high reliability. While a piezoceramic material which meets these requirements has recently been developed by the Institute of High-Frequency Currents, this TsTS-24M matching the PZT-4 developed by the Branson Co. (USA) in 1981-83. New transducer configurations are also being developed at the Institute which with this new material will make power densities up to 20 W/cm^2 at frequencies as low as 18 kHz feasible. They will, however, require forced air cooling. A typical 100 W transducer, a stack of disks 50 mm in diameter, will require a 100-120 W modular oscillator. Such an oscillator can be built with two KT-809 output transistors and, with the relatively low transducer impedance of 400-60 ohms, will need a supply voltage of only 300 V not requiring a transformer. Replacement of all magnetostrictive transducers with such piezoceramic ones would mean a production worth 1.1 million rubles/year, which together with a production of 3700 modular oscillators annually for 55,000 transducers annually, would justify automation of the entire manufacturing process with assembly. The total production cost of 4.4 million rubles/year would be 2 million rubles/year lower than the total production cost of magnetostrictive transducers. Figrues 3; tables 1. [47-2415]

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UDC: 6621.372.852.2

CALCULATION OF WIDE BAND TWO-IMPEDANCE MICROWAVE REFLECTION TYPE DEVICES

Moscow RADIOTEKHNIKA in Russian No 7, Jul 85 (manuscript received 3 Jul 84) pp 86-88

TEKSHEV, V. B. and SHIGABTDINOV, R. A.

[Abstract] A simple method is suggested for designing microwave dual-impedance devices allowing attainment of good initial approximation within a fixed band of frequencies for subsequent experimental or machine optimization. Only reflection type dual-impedance devices are studied, since they have certain known advantages in the microwave band and can serve as the basis for creation of transmission devices using hybrid elements. The task of planning of the devices is reduced to synthesis of passive reactive circuits loaded with an active resistance at the input and having output impedance assigned over a limited frequency band. The method allows the initial approximation of parameters of the coupling circuit to be computed for any switching function by a simpler method than in previously published works. Figures 3; references: 8 Russian.
[10-6508]

UDC 535.417

ADJUSTABLE MULTILAYER DIELECTRIC MILLIMETRIC WAVE RESONANCE

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY:RADIOFIZIKA in Russian Vol 28, No 6, Jun 85 (manuscript received 4 Sep 84) pp 783-787

VERTIY, A. A., GAVRILOV, S. R., DERKACH, V. N., and SHESTOPALOV, V. O., Institute of Radiophysics and Electronics, Academy of Sciences, UkrSSR

[Abstract] The results are presented of a theoretical analysis and an investigation of the optical characteristics of a multilayer dielectric adjustable interferometer operating in the millimetric wave band of electromagnetic waves. The reflection coefficient R and the transmission coefficient T are studied at 150 GHz. The possibility of using this adjustable multilayer

device for controlling the dielectric parameters of substances is considered. Figures 5; references 4: 3 Russian, 1 Western.
[38-6415]

UDC 621.372.8

COMPLEX WAVES IN SHIELDED AND SLOT LINES

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 6, Jun 85 (manuscript received 3 May 84) pp 777-782

OTMAKHOV, Yu. A., POPOV, V. P., and FILIPPOVA, G. S.

[Abstract] It is shown in the literature that in a specific frequency band certain waves of a rectangular waveguide (shield) with a diaelectric layer, connected among themselves by a strip conductor, form pairs of complex "shield waves". This paper investigates such waves in shielded strip and slot lines, by a study of the normal shield waves in the region of the points of the 2-, 3-, and 4-multiples of their degeneracy with respect to the propagation constant. To this end, with the use of a quasi-static approximation of the current density at the strip or the strength of the electrical field at the slot, dispersion equations are obtained for the eigen waves. In an approximation of a weak connection caused by the presence of a strip or slot, and leading to removal of degeneration, these equations are analytically investigated. Asymototic degeneracies are obtained for a propagation constant of the complex "shield waves" and conditions are formed for their existence in the case of two-fold generation of normal shield waves. Figures 4; references: 4 Russian.
[38-6414]

UDC: 621.37/39:534:621.391

STUDY OF ACOUSTICOELECTRONIC DEVICES FOR SPATIAL SIGNAL PROCESSING

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 6, Jun 85 (manuscript received 14 Jul 83) pp 1194-1199

GUREVICH, G. L., ZHIZHENKOVA, L. N., PASKHIN, V. M. and SHKATOV, I. V.

[Abstract] Devices based on spatial and surface acoustical waves for spatial processing of signals can be used in antenna arrays to form multiple radiation patterns, significantly decreasing the weight and size of the arrays. Two types of acousticoelectrical devices for the formation of a multiple-peak radiation patterns are studied and the maximum possible number of channels for each type is determined. Results are presented from experimental studies of one of the two types. Figures 4, references 8: 6 Russian, 2 Western.
[11-6508]

UDC: 621.317.313:537.533

MEASUREMENT OF PARAMETERS OF MICROWAVE BEAMS IN OPEN SPACE WITH LARGE LIQUID CRYSTAL SCREENS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 6, Jun 85
(manuscript received 7 Dec 83) pp 1205-1211

KLYUKIN, L. M., LYAKHOV, Yu. A. and SONIN, A. S.

[Abstract] Results are presented from studies of the effectiveness of the use of cholesterol liquid crystals for the production of quantitative estimates of the distribution of microwave fields in space in the range from millimeter to decimeter waves. Measurements using large screens of cholesterol liquid crystals were duplicated by measurements using the standard method of scanning the radiated beam with probes. The screens were made by applying an absorbing layer on one side of a polyethylene terephthalate film 20 micrometers thick, the liquid crystals on the other side. The studies showed that in addition to the possibility of visualizing the field of microwave radiation over a cross-section on the order of one meter, large liquid crystal screens allow measurement of the field with a threshold sensitivity on the order of $10^{-4}W/cm^2$ and a dynamic range of 10^2 with an accuracy on the order of 15%. Figrues 5, references 18: 15 Russian, 3 Western.
[11-6508]

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UDC: 537.523:621.3.027.89

MODEL STUDIES OF DIELECTRIC STRENGTH OF MULTIPLE-ELECTRODE INSULATING SYSTEMS FOR SUBSTATIONS WITH SWITCHING OVERVOLTAGES

Moscow ELEKTRICHESTVO in Russian No 7, Jul 85 (manuscript received 11 Apr 84) pp 1-7

ALEKSANDROV, G. N., doctor of technical sciences, and KOROTKOV, V. V., candidate of technical sciences, Leningrad

[Abstract] Special studies were performed in order to develop principles of construction of models and determine minimum length of insulating gaps in models for which the similarity criteria are correct for models of the dielectric strength of multiple-electrode insulating systems at substations where switching overvoltages are experienced. Simple screen-screen-ground and screen-ground conductor systems were studied. The dielectric strength of such systems can be analyzed quite simply, significantly facilitating accumulation and analysis of experimental data on the models. Criteria are determined which allow planning of insulating structures using models of smaller dimensions: the basic dimensions of the model and initial system must be geometrically similar; the ratio of initial corona voltage with neighboring electrodes to discharge voltage of a positively charged electrode in the model and initial system must be equal; and the insulating spaces of the model must be such that the discharge develops in leader form. Results of model studies can be used to estimate the discharge voltages of systems modeled corresponding to various overlap probabilities and data on the direction of development of discharges, as well as the insulating spaces required for the switching overvoltages anticipated. Figures 7, references 10: 9 Russian, 1 Western.
[35-6508]

UDC: 537.21.001.24:621.315.61

CALCULATION OF ELECTRIC FIELDS IN IMPERFECT DIELECTRICS

Moscow ELEKTRICHESTVO in Russian No 7, Jul 85 (manuscript received 20 Nov 84) pp 69-71

FILIPPOV, A. A., candidate of technical sciences, Moscow

[Abstract] No existing numerical method of calculating electric fields in kinetical form allows simultaneous consideration of bias current and conductivity current. This article suggests a modification of the method of integral equations allowing computation of the field in imperfect media. The use of the method is said to be more effective than the method of equivalent discharges. The method suggested allows computation of the field while simultaneously considering conductivity current and permeability current. It also allows determination of the frequency characteristics of high voltage apparatus. Furthermore, it can be used to calculate various transient processes if the applied voltage is expanded into a Fourier series and calculations are performed individually for each member of the series. Figures 4, references 4: 3 Russian, 1 Western.
[35-6508]

UDC: 583.3.001.24

ELECTROMAGNETIC DESIGN OF A CONDUCTING DISK

Moscow ELEKTRICHESTVO in Russian No 7, Jul 85 (manuscript received 20 Jul 84) pp 32-38

ASTAKHOV, V. I., candidate of physical-mathematical sciences, Novocherkassk Polytechnical Institute

[Abstract] Materials are presented which can serve as the basis for calculation of the electromagnetic process occurring in a conducting disk, an important part of many electrical devices. An integral equation is derived for the eddy currents in the disk and the transient electromagnetic process in the disk resulting from a change in applied magnetic field upon switching or disconnection of power sources is calculated. Figures 3, references: 8 Russian.
[35-6508]

UDC: 621.315.616.9:620.18

NEW HIGH-VOLTAGE INSULATION DESIGN

Moscow ELEKTRICHESTVO in Russian No 7, Jul 85 (manuscript received 6 Feb 85) pp 9-12

PONOMAREV, L. T., doctor of technical sciences, Leningrad

[Abstract] Nontraditional electric insulating tapes with regular mica barrier called Elastonit have been recently developed in the USSR. Charateristics of several types of electric insulating tapes are presented. The practical problem of synthesis of new Elastonit materials with assigned combinations of properties is solved by selecting conditions of reaction of the functional groups with the corresponding components such that the required structure and, consequently, properties are achieved. The All-Union Scientific Research Institute of Electric Machinery has developed a stable corona-resistant composition of polyfluoroethylene-epoxy and epoxy-polybutadiene functional groups plus mica particles which, when heat treated with the addition of certain additives, yields glass-Elastonit tapes with $1 \cdot 10^{13}$ ohm·m resistance and superior dielectric properties. The material with regular mica barrier and elastic base capable of damping partial discharges arising in the gap has a service life significantly superior to traditional insulation. Electrical aging of high voltage insulation in a 10 MV/m field is related to the development of partial discharges and shorting by gas pores, leading to a significant increase in capacitance. The new designs of high voltage insulation with their capability to damp partial discharges must be considered quite promising. Figures 4, references: 3 Russian. [35-6508]

UDC: 621.314.632+621.319.4.018.782.3.001.24

METHOD OF CALCULATING TRANSIENT AND STEADY-STATE PROCESSES IN CIRCUITS CONTAINING VALVE CONVERTERS AND PERIODICALLY DISCHARGED CAPACITIVE ENERGY ACCUMULATORS

Moscow ELEKTROTEKHNIKA in Russian No 7, Jul 85 (manuscript received 18 Oct 84) pp 19-23

KRASNOV, A. I., engineer, and SEVRYUGOV, A. V., candidate of technical sciences, All-Union Power Engineering Institute imeni V. I. Lenin

[Abstract] One of the important tasks which arises in the creation of systems utilizing discharge of capacitive energy accumulators is development of an effective power supply system and control algorithm. A design method has been developed for circuits containing valve converters, emf inductances and active resistances based on difference equations allowing a solution to be obtained in closed form for a number of very complex problems. The next step

is development of this method for circuits containing not only active and inductive, but also capacitive elements. This article presents the method of calculation, abstracting it from a specific circuit and presenting it as a passive multipole. After writing equations in full differential form and approximately estimating the integrals of currents in branches of the circuit containing an m-pulse balanced bridge converter and periodically discharging capacitive accumulator, two systems of approximate difference equations are obtained. With arbitrary changes in the angles of connection of the converter the processes are described by nonlinear second-order difference equations. The use of the approximate estimates obtained significantly simplifies analysis of steady and transient processes, yielding results quite acceptable in accuracy. Figures 5, references: 4 Russian.
[36-6508]

UDC: 621.313.322-81:536.483

DEVELOPMENT OF DESIGN OF 300 MW CRYOTURBINE GENERATOR

Moscow ELEKTROTEKHNIKA in Russian No 7, Jul 85 (manuscript received 17 Dec 84) pp 2-5

KURILOVICH, L. V., candidate of technical sciences, KHUTORETSKIY, G. M., doctor of technical sciences, FILIPPOV, I. F., candidate of technical sciences, FRIDMAN, V. M., doctor of technical sciences, TYURIN, Yu. G. and VARSHAVSKIY, V. D., candidates of technical sciences, Scientific Research Institute, Elektrosila Production Association

[Abstract] Elektrosila has developed a technical plan and is presently in the process of producing working plans for an experimental 300 MW cryoturbine generator. Technological preparation for production and manufacture of individual units of the 300 MW generator are under way. After testing of the 300 MW unit, a design-technological basis will be created for development and manufacture of 800-1200 MW cryoturbine generators. For this reason the major parameters and dimensions of the generator were not selected as optimal for a 300 MW unit, but rather better fitted to 1000 MW or larger units. For example, with the active generator length 2.4 m, the outside diameter of the rotor is 1.08 m, the inner and outer diameters of the stator core are 1.16 and 2.8 m. Thus, the 300 MW cryoturbine generator is a full-scale model for the creation of 1000 MW and larger units. Figures 3.
[36-6508]

UDC: 621.314.2.027.9:621.374

INCREASING VOLTAGE OF HIGH POWER ELECTRIC PULSES BY MEANS OF A PULSE TRANSFORMER

Moscow ELEKTROTEKHNIKA in Russian No 7, Jul 85 (manuscript received 27 Sep 84) pp 27-29

VDOVIN, S. S., doctor of technical sciences, Dnepropetrovsk State University

[Abstract] The production of megavolt and terawatt electric pulses is difficult and complex. A component part of this problem is increasing the voltage of power pulses of the primary generators used. The problem of increasing the voltage of these pulses can be solved by the use of pulse transformers. However, due to the great voltages and power involved, it is necessary to establish the possibility in principle of increasing voltages to several megavolts, as well as the suitability of the technical and economic characteristics of pulse transformers designed for these purposes. Calculations performed in this article indicate that with pulse lengths of over 1 microsecond, pulse transformers can yield sufficiently high voltages with very slight distortions of transformed pulse shape and power losses. The use of pulse transformers is therefore effective and expedient at pulse lengths of over 1 microsecond. At lengths of less than 0.02 microsecond, pulse transformers apparently become undesirable due to low pulse voltages, great peak distortions and low efficiency. References: 5 Russian. [36-6508]

UDC: 621.313.322.81.017.71

HEATING OF GAS IN CHANNELS OF A ROTOR WITH SUPERCONDUCTING EXCITER WINDING

Moscow ELEKTROTEKHNIKA in Russian No 5, May 85 (manuscript received 23 May 84) pp 9-10

DANILEVICH, Ya. B., doctor of technical sciences, ZHURAVLEV, G. S., candidate of technical sciences, All-Union Scientific Research Institute of Electrical Machinery

[Abstract] The low temperature cooling agent used in a turbine generator with superconducting exciter winding travels from the helium bath to the left and right heat exchangers, from which it moves to the return flow unit. Cooling agent flow is significantly above nominal as the rotor is cooled, so that the gas leaves the bath and heat exchangers at low temperature, is heated as it moves through the system of channels for its transportation to the return flow collector. Thermal shunts can be used to heat the gas leaving the heat exchangers in the process of cooling the rotor. These shunts connect the outer walls of the channel to the rotor tail surface which is at room temperature. Equations are pretested for heat flux density

and temperatures in the system. Results of calculations with the equations agree satisfactorily with test data, indicating that the equations can be used to estimate the gas temperature in the channels. References: 3 Russian.
[19-6508]

UDC: 621.313.322-81:538.945.044.3.002.2

STUDY OF CONNECTIONS OF SUPERCONDUCTING WINDING MATERIAL FOR HIGH POWER CRYOTURBINE GENERATOR ROTOR

Moscow ELEKTROTEKHNIKA in Russian No 5, May 85 (manuscript received 7 Jun 84) pp 10-12

VARSHAVSKIY, V. D., candidate of technical sciences, PLOTKIN, M. B. and TYURIN, Yu. G., engineers, and KHUTORETSKIY, G. M., doctor of technical sciences, Elektrosila Production-Experimental Association, Leningrad

[Abstract] Various methods are known for connecting superconductors, the most common being soldering with indium or soft POS solder over a large area. However, significant dynamic loads arise in superconducting spinning rotor parts, making soft solder joints unsuitable. Silver solder is not usable because of its high melting point. In this article, special devices and joints based on niobium-titanium alloy in a copper matrix with a rectangular cross-section of 2 x 3.5 mm^2 were produced by magnetic impulse welding. Results of testing the first fifteen specimens showed a resistance of 10^{-7} ohms. The contact surface between the copper matrices of the superconductors was subsequently increased significantly by the use of lap joints and preliminary annealing of the copper tubing, followed by etching to remove oxides from the superconductors and tubing. Satisfactory results were obtained when tubing thickness was maintained at 1 mm or more, tubing was annealed, superconductor and tubing were etched, overlap length was at least 60-100 mm and pulse energy was sufficient to support welding to the superconductor matrix. Under these conditions resistances of 10^{-9} ohm were achieved, almost independent of current up to the critical parameters of the superconductor. A magnetic field of over 4 teslas increases the resistance of the joint by a factor of up to two. Figures 2, references: 3 Russian.
[19-6508]

UDC: 621.315.21.3.016.3.001.2

NUMERICAL METHOD OF THERMAL DESIGN OF POWER CABLES

Moscow ELEKTROTEKHNIKA in Russian No 5, May 85 (manuscript received 7 Aug 84) pp 38-41

BRYUKHANOV, O. N., doctor of technical sciences, professor and
TRIGORLYY, S. V., engineer

[Abstract] Increasing the accuracy of computation of permissible current loads in cables requires that thermal calculations be performed considering the actual distribution of temperatures in the cables. An analysis of methods of thermal design of cables showed that numerical methods allowing most complete consideration of various heat exchange factors are superior. The authors suggest the use of the method of finite elements to study thermal states of multiple-conductor power cables laid in various ways. As an example, thermal calculation of three-conductor cable with circular conductors is studied. For a number of cables the permissible current loads calculated by the method of finite elements are greater than those established by the standards documents of calculated according to previous methods. Figures 3, references 5: 4 Russian, 1 Western.
[19-6508]

UDC: 621.313.29.014.2.001.3

SERIES BK CONTACTLESS DC MOTORS

Moscow ELEKTROTEKHNIKA in Russian No 5, May 85
(manuscript received 17 Jul 84) pp 49-50

BUSS, V. A., engineer, VEVYURKO, I. A., doctor of technical sciences,
IVANOV, G. V., KUZMIN, V. N., MIKHAYLOV, Ye. M. and STOMA, A. S., engineers

[Abstract] Implementation of principles described in a previous work has allowed development and introduction to series production of a motor series including 36 standard types and sizes. The series is designed to operate at a nominal voltage of 27 V and includes two main versions: the BK-1 for fans and BK-2 for pumps. The BK-2 motor differs from the BK-1 in that it has a thin sealed sleeve of high impedance nonmagnetic metal separating the rotor and stator cavities, allowing the rotor of the BK-2 to operate in the fluids or other media being pumped. Characteristics of the motors are presented. The BK-1316 has an operating life of about 50,000 hours at nominal speed of 6,000 rpm. The experience of series production of the BK motors has shown the need for further improvement of the design and technology in order to decrease the number of metal cutting, winding and assembly operations required. The use of plastic structures is suggested to this end. Figures 2, references: 2 Russian.
[19-6508]

UDC 621.316.925.1.001.1

STATUS OF AND OUTLOOK FOR DEVELOPMENT OF PROTECTIVE RELAYING AND AUTOMATION DEVICES FOR POWER SYSTEMS

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 85 pp 2-5

ALIMOV, Yu. N., candidate of technical sciences, and SUSHKO, V. A., candidate of technical sciences, All-Union Scientific Research Institute of Relaying EQuipment

[Abstract] The major trends in development of protective relaying and automatic control devices for electric power systems are toward more intricate algorithms of operation, higher response speed and higher reliability, the latter achieved by means of built-in monitoring deviees and by automatic checking, all this being aimed at reducing the cost of maintenance of station and distribution equipment. The need for more intricate algorithms of control and relaying arises from the fact that the difference between anomalous and normal conditions is becoming smaller, while at the same time the power ratings and the costs of electrical power equipment are increasing. This difference decreases as the nominal operating voltage is made higher while the voltage spread within each class is widened so that, typically, a short-circuit current can fall below a nominal current. More intricate algorithms of protective relaying are also needed to allow reducing the margin of insulation and economizing other materials as well. In terms of hardware, these goals are met by replacement of electromechanical relays with static ones using integrated microcircuits. This not only reduces size and weight but also eliminates problems of vibration immunity and contactor life. The changeover is accompanied by standardization of relay components, sizes, and ratings. Plans for the coming 12th five-year-plan period include a new generation of automatic protective relays with extensive use of integrated microcircuits, to serve overhead transmission lines of 500 kV and higher voltage classes, with inclusion of microcomputers and microprocessors for solving diverse problems of automatic control, with inclusion of self-checking means, with the possibility of incorporation into hierarchical dispatch and fault anticipation systems, with better performance characteristics such as speed and precision, also with simpler means of fault analysis and fault data transmission. Replacement of analog relaying techniques with digital ones will greatly contribute to the realization of these goals. Figures 4; tables 1; references: 8 Russian.
[47-2415]

UDC 621.316.925:621.315.051.2.8

PROTECTIVE RELAYING AND LINE AUTOMATION FOR HIGH-VOLTAGE TRANSMISSION LINES

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 85 (manuscript received 4 Feb 85) pp 5-8

YERMOLENKO, V. M., candidate of technical sciences, KOZLOV, V. I., candidate of technical sciences, and KRASEVA, V. N., engineer, All-Union State Planning-Surveying and Scientific Research Institute of Power Systems and Electrical Networks

[Abstract] The allowable response time of existing electromechanical protective relays, 0.04-0.06 s, is much too long for superhigh-voltage transmission lines of up to 750 kV classes connected to AES. It has become necessary to reduce the upper limit of the response time and thus facilitate a faster isolation of faults by standby protection in response to high-frequency two-way communication signals. Most widely used for this purpose are highly sensitive directional zero-sequence current relays operating on the basis of the differential-phase principle with single-phase or three-phase automatic reclosure. This method is particularly suitable for selective protection of very long transmission lines. Such a relaying system needs to be further improved, however, requiring a reliable nearby reserve capacity for all components from instrument transformers to circuit breakers. Its sensitivity and speed during strong electromagnetic transients must be increased. It must be designed for effectively limiting the magnitude and the duration of overvoltages as well as reducing the maintenance time and cost. Additional desirable features include monitoring the extinction of the makeup-current arc during part-phase system operation and lower a.c. power as well as d.c. current requirements for relay operation. References: 4 Russian.
[47-2415]

UDC (621.316.925+621.372.54):621.315.1

DIRECTIONAL HIGH-FREQUENCY PROTECTIVE RELAYS FOR 110-750 kV TRANSMISSION LINES

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 85
(manuscript received 4 Feb 85) pp 8-12

GEL'FAND, Ya. S., candidate of technical sciences, DONI, N. A., candidate of technical sciences, LEVIUSH, A. I., candidate of technical sciences, NAUMOV, A. M., engineer, RUBINCHIK, V. A., candidate of technical sciences, and YARIZ, N. A., candidate of technical sciences

[Abstract] From the standpoint of high-frequency protective relaying, all existing 110-750 kV transmission lines can be classified into the 110-330 kV group with negligible capacitive currents and the 500-750 kV group with

appreciable capacitive currents, some 330 kV lines also belonging to the second group. Accordingly, the response time of protective relays may be as long as two 50 Hz periods for the first group but must not exceed one 50 Hz period for the second group. While differential phase protection has been installed for most 110-500 kV overhead lines, directional filter protection with high-frequency interlocking is found to be preferable for multi-terminal 110-330 kV lines. This type of protective relaying is now being developed for both groups of high-voltage lines, to meet present and future requirements, with either nondirectional or directional high-frequency starting of the transceiver. Design and performance analysis of both schemes indicates that combining them may be required, to ensure sensitivity and response to any short circuit, with possible addition of differential phase protection where necessary for single-phase automatic reclosure. Figures 3; references: 6 Russian.
[47-2415]

UDC 621.315.1:621.316.925

MODERN DISTANCE RELAYS FOR PROTECTION OF ELECTRIC TRANSMISSION LINES

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 85 (manuscript received 4 Feb 85) pp 12-15

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[Abstract] The already commercially produced protective distance relaying equipment of the latest design includes the PDE 2001 panel replacing the DZ-503 panel for 500-750 kV transmission lines, ShDE 2801/2 cabinets replacing EPZ-1636 and PZ-201 panels, module BRE 2801 of impedance relays replacing KRS-2/3 sets, and module BRE 2701 of distance relays replacing the PZ-3 set for protection against any kind of short-circuit along 10-35 kV transmission lines, also a set of distance relays in the Sh 2102 cabinet for protection of 330 kV autotransformers. Any of these new 3-step distance relays is designed for any kind of interphase short-circuit and consists of three impedance relays, an antihunt interlock which includes a starter and an interlock logic, a line protection logic which includes a timing device, and another interlock which responds to faults in the a.c. circuitry. In addition are provided operational monitoring and built-in checking devices. The impedance relays operate as current comparators in conjunction with two instrument rransformers, a summing operational amplifier, frequency filters, and shaping circuits. The antihunt interlock is extra sensitive to remote short-circuits and capable of starting the third (last) stage of an impedance relay, that stage being stensitive to an interphase short-circuit current not smaller than 5% of the nominal line current. It includes two channels, a negative-sequence channel and a positive-sequence channel feeding into a common logic module, each channel consisting of a respective sequence filter with a low-pass filter followed by an increment

discriminator (inverting active band-pass filter and summing operational amplifier) and then a rectified-current differentiator (rectifier, integrator in parallel with noninductive circuit, rough-response sensor, fine-response sensor). The panels and the cabinets are designed to coordinate the operation of all protective relaying devices by proper interconnection and circuit matching, with inclusion of necessary reserve capacity. Figures 5; references: 14 Russian.
[47-2415]

UDC 621.316.57:621.315.051.2.85/875

DEVICE FOR SINGLE-PHASE OR THREE-PHASE AUTOMATIC RECLOSURE OF 500-750 kV TRANSMISSION LINES

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 85 (manuscript received 4 Feb 85) pp 19-22

STRELKOV, V. I., engineer, FOKIN, G. G., candidate of technical sciences, YAKUBSON, G. G., candidate of technical sciences, and KOSTINA, A. D., engineer

[Abstract] A device for automatic reclosure of 500-700 kV as well as 220-330 kV transmission lines in conjunction with the new PDE 2000 protective relaying and line automation equipment set has been developed by the All-Union Scientific Research Institute of Electrical Power Engineering and the All-Union State Planning-Surveying and Scientific Research Institute of Power Systems and Electrical Networks, jointly with the Chelyabinsk Electrical Equipment Plant, to replace the APV-751 device and later also the APV-503 device. The principal functions of this PDE 2004.01 are: identification of the faulty phase and its automatic reclosure after a phase-to-ground short, with the aid of selective elements; disconnection of three phases and their automatic reclosure once after any kind of polyphase short (including one evolved from a single phase-to-ground short or caused by faults in not yet disconnected phases) and prior to single-phase automatic reclosure, with any direct phase-to-phase short isolated immediately ahead of selective action; disconnection of three phases after any kind of short with possibility of three-phase automatic reclosure after unsuccessful single-phase automatic reclosure; three-phase automatic reclosure once after three phase had been disconnected for reasons other than a fault or a human error. The additional functions of this device are: monitoring the line and two busbar sets for presence or loss of voltage; accelerating the action of backup units; pulling all the selective elements into the automatic mode of action; protecting all stages of directional current relays against shorts to ground; automatically pulling the line relays into protective disconnection of three phases regardless of automatic reclosure when the d.c. supply for the latter is lost or the logic of single-phase automatic reclosure fails. Use of phase currents as restraints for tuning out the current unbalance during direct phase-to-phase shorts makes the PDE 2004.01 device extremely current sensitive, while addition of a special component which eliminates the need for smoothing both the actuating voltage and the restraining voltage after

rectification ensures a very high response speed. The device is furthermore immune to pulse interference and operates with a stabilized 24 V power supply, a diode preventing a spurious action in response to inadvertent grounding of interpanel-monitor wires, its reliability being enhanced by continuous monitoring of the principal components and by semiautomatic spot-check testing. References: 13 Russian.
[47-2415]

UDC 621.314.222.6:621.316.925

EQUIPMENT SET FOR PROTECTION OF AUTOTRANSFORMERS

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 85 (manuscript received 4 Feb 85) pp 29-31

NADEL, L. A., candidate of technical sciences, LINT, M. G., candidate of technical sciences, and RIBEL, N. Ye., engineer

[Abstract] An equipment set for protection of 500+ kV power autotransformers has been developed in 1982-83 by the All-Union Scientific Research Institute of Relay Engineering and the All-Union State Planning-Surveying and Scientific Research Institute of Power Systems and Electrical Networks, jointly with the Chuvash State University. The entire equipment is contained in three cabinets. The first cabinet Sh2101 houses differential protection of an autotransformer and of its low-voltage busbars, one or two (depending on the voltage class) lead high-voltage insulation testers, protective devices for two-phase operation, circuits for automatic acceleration of backup action, overload relays, an alarm circuit signaling a short to ground on the low-voltage side, and tripping circuits. The second cabinet Sh2102 houses two 2-step distance relays and two directional zero-sequence current relays, one of each kind for the low-voltage side and another for the intermediate-voltage side, and circuits for manual acceleration of backup action. The third cabinet Sh2103 houses backup differential protection of an autotransformer as well as of its high-voltage and intermediate-voltage busbars, peak-current relays with holding elements for the low-voltage side, protection of the reactive branch on the low-voltage side, gas-leak protection circuitry, and tripping circuits. Each cabinet contains a 100 W line-voltage converter and a set of storage batteries as alternative power supplies. Reliability of the entire equipment is ensured by continuous operational monitoring of all meters and periodic spot-check testing of each cabinet, with appropriate logic and interlocking.
[47-2415]

UDC 621.316.923:621.318.43:621.311.4.027.8

CABINET Sh2104 WITH PROTECTIVE EQUIPMENT FOR SHUNTING REACTORS

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 85
(manuscript received 4 Feb 85) pp 31-33

MOGILEV, G. P., engineer, KOZINA, N. I., engineer, IVANOVA, N. M., engineer, and BERGER, P. A., engineer

[Abstract] A cabinet with a set of protective equipment for shunting reactors has been developed by the All-Union Scientific Research Institute of Relay Engineering. This Sh2104 cabinet houses relays for protection and control of compensating reactors as well. The equipment will protect a reactor whether the latter is connected into the line directly or through a tripping switch, by disconnecting it from the line or by actuating that switch respectively. For better reliability, the equipment for protection of shunting relays is grouped into a main set and a backup set. The main set includes longitudinally-acting differential phase-current relays, lead high-voltage insulation checkers, gas-leak protection, and standby reactor or line disconnectors. The backup set includes a 2-step zero-sequence current relay. The equipment for protection of compensating reactors consists of longitudinally acting differential current relays, distance relays, peak-current relays, and gas-leak protection. Two power supplies (50 W and 100 W) are provided for energizing all the equipment in this cabinet. Provided are also means for continuous operational monitoring and spot-check testing. The overall dimensions are 600x600x2200 mm^3, the total weight is 250 kg. Figures 2, references: 1 Russian.
[47-2415]

UDC 621.3.078(001.24)

ADJUSTMENT OF RVA-62 AUTOMATIC FIELD-CURRENT REGULATOR

Moscow ELEKTRICHESKIYE STANTSII in Russian No 8, Aug 85 pp 43-45

PETROV, A. A., engineer, and KARKAZOV, Ye. I., engineer, Ural Power System for Ferrous Metallurgy

[Abstract] While the RVA-62 automatic field-current regulator performs adequately with small and medium-size turbogenerators, its stability margin being often sufficiently large to compensate design inaccuracies, a refinement is nevertheless recommended to ensure reliability under no-load as well as during parallel operation of generators into a common busbar group. The procedure is based on necessary adjustments of over 40 units and applies to redesign, measurements, breadboard simulation, settings, reassembly, and testing. First it is necessary to determine the correct number of primary and secondary turns in the universal controlled phase-compounding transformer, taking into account the parameters of associated equipment (autotransformer, filter choke, power rectifier, current transformer) as

well as various modes of generator instability and the use of automatic field suppression. Revisions in testing circuitry and procedure are proposed, including more precise and some extra measurements, also replacement of selenium rectifiers with silicon diodes. Adjustments according to this scheme have been made in the RVA-62 regulators for 6-60 kW generators with VT exciters and 3000-12,000 kW generators, including Skoda, Siemens-Schuckert GmbH, Parsons Ltd units. Figures 4; references: 2 Russian.
[48-2415]

UDC 621.311.25:621.039.007.2:658.386.001.5

COMPREHENSIVE TRAINING SIMULATION SYSTEM FOR OPERATORS OF POWER UNITS IN TES AND AES

Moscow ELEKTRICHESKIYE STANTSII in Russian No 8, Aug 85 pp 8-13

TSIPTSYURA, R. D., candidate of technical sciences, Kiev Institute of Automation

[Abstract] The accident at the Three Mile Island nuclear power plant, a result of human error, stimulated a more urgent need to develop training simulation systems involving the use of computerized simulator training devices for the operating personnel, particularly machinists, in power units of thermal electric and atomic electric power plants. It has been established that successful performance of duties by a human operator as component of the control loop depends on psychophysiological makeup, knowledge and understanding of the technological process, thinking habits and alertness, assimilation of experience, and interaction with other control components including other human operators and training simulation systems must be based on these factors. In the design proposed by the Kiev Institute of Automation and experimentally tried at the Educational and Training Center of the UkSSR Ministry of Energy, the psychophysiological aspect has been formalized as professiograms defining requirements for emotional stability, attention span, ability to think rationally in technical terms, ability to process information both fast and reliably to acquire necessary perception and movement habits, and memory capacity. The next step is education of the operator to an extent necessary for grasping all relevant technical aspects of the situation. This is followed by getting the operator accustomed to performance of duties, controlling processes already in progress or completed and shift work. The training system consists of five subsystems: 1) evaluation and recommendations; 2) assimilation of knowledge; 3) assimilation of operational logic; 4) simulation on a full-scale simulator panel utilizing M.4030.1 and M.400 computers for simulated performance of control by the operator and computer modelling of results; 5) evaluation of competence. Figures 3; tables 1; references 11: 9 Russian, 2 Western.
[48-2415]

UDC 621.314

HEAVY-POWER CONVERTERS IN ELECTRICAL POWER INDUSTRY

Moscow ELEKTRICHESKIYE STANTSII in Russian No 8, Aug 85 pp 38-42

POSSE, A. V., doctor of technical sciences, and MERZHEVSKIY, V. A., candidate of technical sciences, Scientific Research Institute of Direct Current and Its Moscow Department

[Abstract] Power semiconductor devices, specifically thyristors, are increasingly used for conversion of electric energy in power generation and transmission systems. The two major applications are a.c. to d.c. conversion for d.c. power transmission from synchronous a.c. generators or d.c. power insertion into network ties and d.c. to a.c. conversion for a.c. power transmission from MHD d.c. generators. They are also used with energy storing capacitors for peak-load coverage and with controllable sources of reactive power as static compensators. Other applications include frequency-controlled starting of large synchronous machines, with the converter operating first in the pulse mode at very low speeds and then switched to the continuous mode as the speed increases, speed control of squirrel-cage induction motors, contactless switching and current limiting especially for protective purposes, energizing of electric air filters, and emergency group-sequential load throw-off. The converting equipment is usually installed in substations or in the main plant. Figures 4; references: 6 Russian.
[48-2415]

UDC 621.315.66.027.3

TWO-POLE SUPPORT WITH ISOLATING CROSS-ARM ROPE FOR 330 kV OVERHEAD TRANSMISSION LINE

Moscow ELEKTRICHESKIYE STANTSII in Russian No 8, Aug 85 pp 52-55

KURNOSOV, A. I., candidate of technical sciences, KOMAROV, L. L., engineer, and VINOGRADOV, D. Ye., engineer, Northwestern Department, All-Union State Planning-Surveying and Scientific Research Institute of Power Systems and Electrical Networks

[Abstract] An anchor segment of the 330 kV overhead transmission line in the Kola peninsula is the first one in the USSR where rope joining the two poles of a support structure across the top and suspending the three symmetric conductors of a 3-ϕ system is used as a flexible cross-arm, 13 such cross-arms having been installed along that segment. They are designed for carrying 2xAS300/39 and 2xAS400/51 conductors with ice load (regions I,II) in heavy wind (region III). Glass insulators are strung on the rope, 28 separating the center conductor form each outer conductor and 16 separating each outer conductor from the pole on its side, another design

variant being available for use of plastic insulators. Such a cross-arm offers several technical and economic advantages over conventional rigid guys, smaller mass and simpler construction with 3.3 times fewer bolts being the major ones. It also requires a shorter erection platform and a shallower foundation in grounds which swell appreciably. On the other hand, however, it requires a wider clearance, unconventional means of access to conductors, corrective adjustment of erection procedures, and special labor skills such as handling of insulators. Since relatively few operations are inovlved, entire supports can be preassembled in sheds. Figures 5; tables 1; references: 2 Russian.
[48-2415]

UDC 621.315.624.015.1

VOLTAGE DISTRIBUTION ALONG 330-750 kV TENSION INSULATOR CHAINS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 8, Aug 85 pp 55-58

GORBUNOV, P. V., engineer, REDKOV, V. P., candidate of technical sciences, KKYLOV, S. V., candidate of technical sciences, and FEL'DMAN, M. L., candidate of technical sciences, Leningrad Polytechnic Institute; All-Union Scientific Research Institute; Northwestern Department, All-Union State Planning-Surveying and Scientific Research Institute of Power Systems and Electrical Networks

[Abstract] Tension insulator chains on superhigh-voltage transmission lines usually include open or closed protective shielding rings, which reduce the electric field intensity near mounts and fasteners and the nonuniformity of the voltage distribution along these chains. The feasibility of eliminating shields and instead moving the lower insulators closer to a split phase conductor has been established theoretically and was confirmed experimentally in a study of chains of glass dish insulators 2x17 PS160-B, 2x19 PS120-B, 2x22 PS70-B with 2xAS 500/27 conductors in 30 m long 330 kV line segments and 2x20 PS160-B, 2x33 PS70-B with 2xAS 500/27 conductors in 30 m long 500 kV line segments, mounted on supports 20-30 m above ground. Into consideration was taken the need for using bundles rather than single insulator chains to boost their mechanical load capacity and thus improve their reliability. The voltage distribution along bundles of three, four, five, and eight insulator chains was measured with the shielding loop at various distances from the first few insulators of a chain. The voltage peak at the most heavily loaded insulator was found to increase linearly with that distance. Corona tests revealed no discharge at the surface of glass insulators and of accessory hardware, even under the maximum voltage, indicating no need for voltage equalization and thus no need for shielding insulator chains on 330 kV and 500 kV transmission lines. Toroidal aluminum shields are still recommended, however, for tension insulator chains on 500 kV outdoor distribution lines as well as on 750 kV transmission and distribution lines. Figures 4, tables 1, references: 6 Russian.
[48-2415]

UDC 621.311.62:621.391.82.001.4

DEPENDENCE OF LEVEL OF RADIO INTERFERENCE FROM INSULATORS ON ATMOSPHERIC CONDITIONS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 8, Aug 85 pp 73-75

KIM YEN DAR, candidate of technical sciences, and TARASOVA, N. F., engineer, Special Design and Manufacturing Engineering Office, Military-Industrial Association for All-Union Planning and Development of Electrical Network Insulation (VPO Soyuzelektrosetizolatsiya)

[Abstract] Radio interference is becoming an increasingly important factor in selection and design of insulators for overhead transmission lines, inasmuch as the trend toward superhigh voltages carries with it problems of ionization and high-frequency currents. Extensive experimental studies made in the high-voltage laboratory at the Special Design and Manufacturing Engineering Office of Soyuzelektrosetizolatsiya over a period of two years have yielded a wealth of data on radio interference from insulators under various atmospheric conditons. While the air temperature was varied over the 13-35°C range and the air pressure was varied over the 742-761 mm Hg range, the relative humidity was varied from 30% to 80%. Along with PSG 120 and PS 160-V glass dish insulators were also tested model glass disks 200 mm in diameter and 10±2 mm thick between a high-voltage electrode 12 mm in diameter at the contact with glass and a ground electrode 70 mm in diameter. The level of radio interference was found to depend strongly on the relative air humidity. Analysis and interpretation of the data in terms of the fundamental relation between high-frequency current and maximum electric field intensity indicates that this relation is influenced by the relative air humidity, inasmuch as the electrical resistivity of the dielectric material depends on the latter. Theory thus confirms the evidence that the interference level drops with rising relative air humidity, probably because the electrical surface resistivity of the dielectric material then decreases and this tends to reduce the nonuniformity of the electric field along the insulator. Figures 3; references 5: 2 Russian, 3 Western (1 in Russian translation). [48-2415]

UDC 621.319.7

ANALYTICAL MODEL OF HUMAN BODY IN AREA INFLUENCED BY SUPERHIGH VOLTAGE OVERHEAD LINES

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian, No 5, May 85 (manuscript received 10 Jan 84) pp 66-69

MUSTAFAEV, R. I., candidate of technical sciences, and KRUTKO, Ye. G., Azerbaydzhan Scientific Research Institute for Power Engineering imeni I. G. Yes'man

[Abstract] A new model for the human body is proposed that makes it possible, employing the smallest possible number of fictitious charges, to perform biomedical research, by establishing the current distribution in the human body analytically, and also to determine the induced leakage potentials and currents in the system consisting of a superhigh voltage overhead line, a human body, and grounded or ungrounded objects. The proposed model reflects the real shape and surface area of the human body with sufficient accuracy, and can be used to calculate the total leakage current through the legs of grounded body to within 5%. The displacement current can be found to within 15%. References 8: 2 Russian, 6 Western.
[299-6900]

UDC 697.34.621.039

METHOD FOR CALCULATING OPTIMAL PARAMETERS OF LONG-DISTANCE HEAT SUPPLY SYSTEMS

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian No 5, May 85 (manuscript received 5 Jan 84) pp 70-74

AMINOV, R. Z., doctor of technical sciences, professor, and DOLGINA, V. D., engineer, Saratov Polytechnical Institute

[Abstract] A method is presented for determining the optimal parameters of long-distance twin-pipe heat supply systems. The optimal water temperature for long-distance twin-pipe heat supply systems is found to be less than 126°C when the distance to the user is in the 10-30 km range, and 200°C for distances of 50 km or more. The findings indicate that the ratio of the calculated heat output of the plant and the heat load of the region in which the heat is consumed is 0.8 for systems in which the water is stored daily in order to cover electrical load peaks. Figures 3, references: 3 Russian.
[299-6900]

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UDC 621.382

OPTIMAL DESIGN OF GALLIUM-ARSENIDE LSI LOGIC ELEMENTS

Moscow MIKROELEKTRONIKA in Russian Vol 14, No 5, Sep-Oct 85
(manuscript received 29 Jun 84) pp 371-380

STAROSELSKIY, V. I., Moscow Electronic Engineering Institute

[Abstract] This study investigates the choice of threshold values, circuit arrangements, topological oprimization and the influence of gate length for commercially introduced gallium arsenide LSI circuits. The types of components employed in gallium arsenide LSI circuits are enumerated. The parameters of active components are analyzed. Optical elements based on normally-open and normally-closed transistors are investigated. The factors influencing gate speed are enumerated. All of the types of LSI components are analyzed, and recommendations for their use are given. Figures 5, references 9: 2 Russian, 7 Western.
[41-6900]

UDC 681.326.74.06

SIGNATURE ANALYZER FOR BUILT-IN VLSI CIRCUIT TESTING

Moscow MIKROELEKTRONIKA in Russian Vol 14, No 5, Sep-Oct 85
(manuscript received 15 Oct 84) pp 385-388

ROTNOV, S. V.

[Abstract] The use of a control module in a signal analyzer in order to implement built-in VLSI circuit testing is described. The signature analyzer used for built-in testing provides a number of operating modes that make it possible to test the VLSI circuit at specified internal points, to analyze the combined functioning of these points, and to obtain timing diagrams of the circuit operation at the test points. Modules can be tested either separately or while in operation, and the test circuit can be employed at different levels in a system. The greatest effect is achieved by employing signature analyzers in VLSI circuits with more than 2000 equivalent gates per chip. Figures 1, references 5: 1 Russian, 4 Western.
[41-6900]

UDC 621.376.4

SINGLE SIDEBAND MODULATOR EMPLOYING HOLLOW MICROWAVE INTEGRATED CIRCUITS

Moscow MIKROELEKTRONIKA in Russian Vol 14, No 5, Sep-Oct 85
(manuscript received 27 Jul 84) pp 408-414

GROZDEV, V. I. and LITVINENKO, M. Yu., Moscow Institute of Electronic Machine Building

[Abstract] A single sideband integrated-circuit microwave modulator is described that consists of a hollow module containing four layers of metal separated by three layers of dielectric. Slot transmission lines are placed symmetrically at the ends of the metal layers, forming two loops with half-wave parameters, with their closest sides connected by a slot transmission line segment. The modulator is nonlinear so that the output spectrum contains lower sidebands as well as high-order side frequencies. The device can be employed as a full-phase keyer with a phase step of 92°. The results of experimental investigations of a prototype confirm that the hollow integrated module can be employed as a single sideband modulator in the analog mode and as a full-phase keyer in the digital mode, and that the energy and dynamic characteristics of the device can be improved. The possibility of using the device in the shortwave portion of a microwave band is addressed. Figures 5, references 11: 7 Russian, 4 Western.
[41-6900]

UDC 539.8

PHENOMENA IN ACTIVE DISTRIBUTED SYSTEMS

Moscow MIKROELEKTRONIKA in Russian Vol 14, No 5, Sep-Oct 85
(manuscript received 22 May 85) pp 389-407

KERNER, B. S. and OSIPOV, V. V.

[Abstract] This study investigates the phenomena occurring in homogeneous distributed semiconductor media that govern the reliability of many semiconductor devices and that can also be exploited in conducting functional miniature electronic devices for information processing and storage. General requirements are formulated for the parameters of distributed systems for which static, pulsating, or traveling intrinsic states can be excited. Active distributed systems are classified in terms of the type of phenomena realized. It is found that different types of complex waves and refined structures can be excited depending upon the properties and the parameters of the system. Formulas are derived for the basic parameters of simple autosolitons and multiple-autosoliton states. The evolution of autosolitons in different systems as the level of nonequilibrium changes is investigated. Figures 7, references 45: 44 Russian, 1 Western.
[41-6900]

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UDC: 621.391:534.535

SPACE-TIME RESPONSE OF ACOUSTICOOPTICAL SYSTEM TO COMPLEX RADIO SIGNAL

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 6, Jun 85
(manuscript received 17 Oct 83) pp 1241-1243

VASILYEV, Yu. G.

[Abstract] Previous works have studied acousticooptical time scale converters with two acousticooptical modulators. However, the functional capacity of these devices is not limited to changing the time scale of radio signals, they can also be used to determine the type of amplitude modulation or frequency modulation of complex radio signals. For this purpose, the present article studies the space-time response of an acousticooptical system of time dispersion type to AM-FM signals. The space-time response to the input radio signal is analyzed as the distribution of intensity of first diffraction order light in the focal plane of the integrating lens. The analysis of diffraction of light in the acousticooptical system shows that the amplitude of the spatial response of the system varies in accordance with the square of the input AM-FM signal envelope, while the center of the response moves as a function of the type of FM. This result can be used in the development of acousticooptical devices for analysis of dispersion-type signals intended for determination of the frequency-time structure of complex radio signals.
Figure 1, references: 9 Russian.
[11-6508]

UDC: 534.874.2:535.241.13

ANALYSIS OF EFFECTIVENESS OF MULTIPLE-ELEMENT ELECTROACOUSTICAL CONVERTERS WITH AUTOMATIC TUNING OF SONIC BEAM IN BRAGG ACOUSTICO-OPTICAL DEVICES. PART I

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 7, Jul 85 (manuscript received 4 Jun 84) pp 908-921

GRIGOR'YEV, M. A., PETROV, V. V. and TOLSTIKOV, A. V., Saratov State University

[Abstract] A discussion is presented of matching of multi-element electro-acoustical transducers with signal sources. The conversion factor is determined for various spatial harmonics of the exciting electromagnetic field. The transducers studied are sequences of piezoelectric elements in phase or counterphase, as well as elements contained in multiple-element low-pass or high-pass filters. The results and analyses presented can be used in design of acoustico-optical devices using multi-element electro-acoustical transducers. Part II of this article will be dedicated to the optimal transmission factor, providing the maximum intensity of diffracted light for low-pass and high-pass transducers. Figures 5, references 7: 4 Russian, 3 Western.
[8-6508]

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